CASE REPORT

Hydrotherapy for the Management of Chronic Ankle Instability in a 29-Year-Old Obese Female – A Case Report

Sneha Thirugnana Sambandam[1], Harshavardhini Anburaj[1], Nikhil Roy Mohan[1], Praveen Ravi[1], Raju Balaji[2]

[1] Department of Sports Medicine, Saveetha Medical College & Hospital (SMCH), Saveetha Institute of Medical and Technical Sciences (SIMATS), Thandalam, Chennai-602105, Tamil Nadu, India
[2] Molecular Biology and Genomics Lab, Department of Orthopaedics, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences (SIMATS), Thandalam, Chennai-602105, Tamil Nadu, India.

ABSTRACT

Chronic ankle instability (CAI) is a common consequence of ankle sprains, significantly impacting mobility and quality of life, especially in obese individuals. This case report presents the rehabilitation of a 29-year-old obese female with CAI, experiencing recurrent pain and instability despite prior conservative treatments. Hydrotherapy was selected as the primary intervention due to its ability to minimize joint stress while enhancing strength and proprioception. The patient completed four hydrotherapy sessions per week for 12 weeks, focusing on ankle strengthening, balance, and functional exercises. Her Visual Analog Scale (VAS) pain score improved from 7/10 to 3/10, and her Cumberland Ankle Instability Tool (CAIT) score increased from 17 to 29, reflecting enhanced stability. These results highlight hydrotherapy as a viable rehabilitation approach for CAI in obese individuals, supporting further research on standardized protocols to optimize recovery and long-term outcomes.
Malaysian Journal of Medicine and Health Sciences (2026) 22(SUPP5): 136-139. doi:10.47836/mjmhs.22.s5.28

Keywords: Ankle Sprain Recovery, Chronic Ankle Instability, Hydrotherapy Rehabilitation, Obesity and Joint Health, Proprioception and Balance

Corresponding Author:
Raju Balaji, Ph.D
Email: balajir24.smc@saveetha.com
Tel: +919865384408

INTRODUCTION

Ankle sprains account for 15% to 30% of musculoskeletal injuries, affecting women more frequently than men. Up to 73% of patients experience recurrent ankle inversion after an initial sprain, and 30% to 70% of untreated cases progress to chronic ankle instability (CAI). CAI results in persistent instability, pain, and dysfunction due to inadequate ligament healing, mechanical instability, and impaired neuromuscular control. This condition reduces quality of life, limits physical activity, and increases the risk of ankle osteoarthritis (1). Obesity further complicates CAI management by increasing mechanical stress on weight-bearing joints, exacerbating symptoms, and delaying recovery. Higher body mass intensifies ground reaction forces, straining weakened ligaments (2). Additionally, obesity impairs proprioception and balance, critical for CAI rehabilitation. Patients with high BMI face challenges with traditional rehabilitation due to pain and mobility limitations. Hydrotherapy has gained recognition as an effective rehabilitation approach for musculoskeletal conditions, including CAI. By reducing weight-bearing load, hydrotherapy minimizes pain while facilitating muscle strengthening, joint stability, and proprioception improvements (3,4). The water's resistance provides a low-impact environment, making it particularly beneficial for obese individuals unable to tolerate land-based exercises. Recent studies have further supported the efficacy of water-based exercise in improving body composition, metabolic health, and mobility outcomes in overweight and obese populations (2,4). This case report explores hydrotherapy's role in treating a 29-year-old obese female with CAI. Given her history of recurrent ankle sprains and challenges with conventional rehabilitation, hydrotherapy was selected as the primary intervention. It contributes to the growing evidence supporting hydrotherapy as an effective treatment for CAI, particularly in obese populations with limited rehabilitation options.

CASE REPORT

A 29-year-old obese female presented to the sports medicine outpatient department of Saveetha Medical College and Hospital with complaints of chronic instability and recurrent pain in her right ankle, persisting for over six months. Informed consent was obtained from the patient for the publication of this case report. As per institutional guidelines, ethics committee approval was not required for a single-patient case report. The patient reported a history of multiple ankle sprains over the past

three years, with the most recent injury occurring eight months prior to her visit. Despite undergoing initial conservative management, including rest and physical therapy, her symptoms progressively worsened. At the time of presentation, the patient reported a Visual Analog Scale (VAS) pain score of 4/10 at rest, increasing to 7/10 during physical activity, particularly during weight-bearing tasks. She also described episodes of the ankle "giving way" while walking on uneven surfaces. There was no reported history of ankle locking or swelling, but the patient did mention a sensation of instability that frequently affected her daily activities, including walking and standing for prolonged periods. She had no significant co-morbidities aside from her obesity, with a Body Mass Index (BMI) of 34 kg/m². Physical examination revealed tenderness over the anterior talofibular ligament (ATFL) and the lateral aspect of the ankle. The range of motion (ROM) of the affected ankle was mildly reduced compared to the contralateral side, with dorsiflexion at 10 degrees and plantarflexion at 35 degrees. The patient experienced discomfort at the extremes of inversion and eversion, with notable translation on the anterior drawer test. A positive talar tilt test was also observed, indicating lateral ligament laxity. No significant swelling or erythema was present. The patient's gait was antalgic, and she demonstrated a difficulty maintaining balance during the single-leg stance test, particularly on the affected side.

Radiographic imaging of the ankle, including standard anteroposterior and lateral views, showed no bony abnormalities or acute fractures. However, magnetic resonance imaging (MRI) revealed a grade 2 sprain of the lateral collateral ligaments, including the anterior talofibular ligament (ATFL), posterior talofibular ligament (PTFL), and calcaneofibular ligament (Figure 1).

Figure 1: Magnetic resonance image of right ankle. (A) Sagittal MRI view showing sprain of lateral ligaments (ATFL and CFL); (B) Axial view depicting edema and effusion in the subtalar joint

There was also a grade 1 sprain of the medial (deltoid) collateral ligaments, involving the tibionavicular, tibiospring, and tibiocalcaneal ligaments. Additionally, a sprain of the flexor retinaculum and a grade 1 sprain of the interosseous talocalcaneal ligament (ITCL) was also noted. The findings also indicate minimal to mild joint and bursal effusion, subcutaneous edema, and a likely Stieda process. Given her history of recurrent ankle sprains and ongoing functional instability, the patient was diagnosed with CAI, further complicated by her obesity. Due to the patient's BMI and limitations with land-based rehabilitation, hydrotherapy was chosen as the primary intervention after obtaining informed consent. This approach reduced weight-bearing load and enabled functional exercises without worsening pain. The protocol included four 30 to 45-minute sessions per week, focusing on ankle strengthening, proprioceptive training, and balance exercises in a hip-level swimming pool (Table I). Water buoyancy facilitated a greater range of motion with minimal discomfort, while resistance helped strengthen stabilizing muscles.

Alongside rehabilitation, the patient followed a calorie deficit diet to aid weight loss and reduce BMI (Table I, Figure 2). The plan targeted a daily 500-kilocalorie deficit with balanced macronutrient intake. To support overall fitness, upper body strengthening exercises were recommended to improve muscle endurance without stressing the ankle. At initial evaluation, the Cumberland Ankle Instability Tool (CAIT) score was 17/30, indicating significant instability. Along with the Visual Analog Scale (VAS), these objective outcome measures were used to track the patient's pain and functional recovery throughout the hydrotherapy program, ensuring clinical progress was quantifiable and reproducible. After the first week of hydrotherapy, the patient reported slight pain improvement (VAS 5/10) and fewer instability episodes. The CAIT score increased to 20, reflecting functional stability progress. By the third week, dorsiflexion reached 15 degrees and plantarflexion 40 degrees, with better single-leg balance in water. The VAS score dropped to 4/10, and the CAIT score rose to 23. At eight weeks, the VAS score improved to 3/10, and the CAIT score reached 26. The patient resumed daily activities, including walking on uneven surfaces, with fewer instability episodes. At 12 weeks, the patient reported significant improvements (VAS 1/10) and a final CAIT score of 29. She was discharged from hydrotherapy and transitioned to land-based rehabilitation for further strengthening and proprioceptive training. Her prognosis was optimistic, with continued progress expected through adherence to her rehabilitation program.

DISCUSSION

Chronic ankle instability (CAI) results from repeated ankle sprains, leading to mechanical instability and impaired neuromuscular control. This case highlights a 29-year-old patient with progressive ankle instability,

Table I: Details of the 12-weeks hydrotherapy-based ankle rehabilitation program

Training period	Exercises	Training duration	Sets and repetitions	Progression criteria
Week 1 to 4	Warm-up (gentle water walking or light aqua jogging)	30 to 35 mins	Five to ten minutes	VAS – 2/10, No swelling
	Two compound exercises (e.g., squats, lunges, lateral walks, calf raises)		Three sets of eight repetitions each	
	Two isolation exercises (e.g., ankle dorsiflexion, plantarflexion)		Three sets of eight repetitions each	
	Balance exercises (single-leg stance)		Five sets each leg	
Week 4 to 8	Warm-up (Aqua jogging)	35 to 40 minutes	Ten minutes	VAS – 2/10, No swelling
	Three compound exercises (e.g., squats, lunges, lateral walks, calf raises)		Three sets of 12 repetitions each	
	Three isolation exercises (e.g., ankle dorsiflexion, plantarflexion, inversion, eversion)		Three sets of 12 repetitions each	
	Balance exercises (single-leg stance, heel-to-toe walks)		Five sets each leg; Five minutes of walking	
Week 8 to 12	Warm-up (Aqua jogging)	35 to 45 minutes	Fifteen minutes	VAS – 2/10, No swelling
	Three compound exercises (e.g., squats, lunges, lateral walks, calf raises)		Three sets of 15 repetitions each	
	Three isolation exercises (e.g., ankle dorsiflexion, plantarflexion, inversion, eversion)		Three sets of 15 repetitions each	
	Balance exercises (single-leg stance, Double leg hops, Squat jumps, heel-to-toe walks)		Five sets each leg; Five minutes of walking	

Note: VAS - Visual Analog Scale

a common consequence of untreated acute sprains, affecting up to 70% of cases. Her obesity (BMI 34 kg/m) further complicated recovery, increasing joint stress and impairing proprioception, as reflected in her poor single-leg stance test performance. Hydrotherapy emerged as an effective rehabilitation method, aligning with findings by Kapusta and Irzmański, who demonstrated its benefits in reducing swelling and improving mobility in atherosclerotic ischemia patients (5). Our patient similarly experienced decreased pain (VAS score reduction from 7 to 3) and improved ankle function (CAIT score increase from 17 to 29). These findings reinforce hydrotherapy's efficacy in CAI rehabilitation. Supporting this, Javorac et al. reported that hydrotherapy with super-saturated hydrogen-rich water enhanced recovery in a professional athlete with an ankle sprain, reducing pain and accelerating return to activity (3). Another trial by Javorac et al. compared hydrotherapy to the RICE

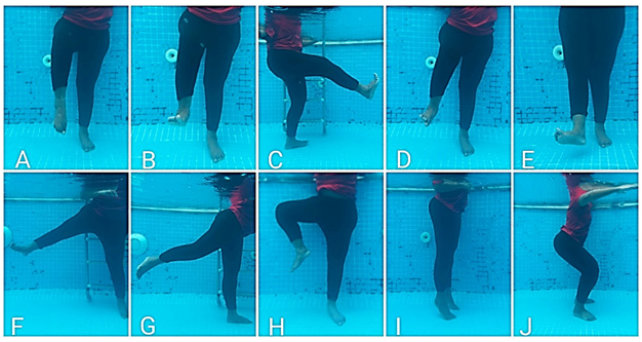

Figure 2: Hydrotherapy exercises performed during rehabilitation: A. Ankle dorsiflexion in water, B. Ankle plantarflexion, C. Ankle circles, D. Heel-to-toe walking, E. Balance board in water, F. Single-leg stance, G. Resistance band exercises, H. Step-ups in water, I. Walking on underwater treadmill and J. Squat and lift movement

protocol in acute ankle sprains, finding similar recovery outcomes with enhanced functional performance (3). These studies highlight hydrotherapy's applicability across various populations, including chronic CAI patients. A recent systematic review by Zhu et al. (2023) further substantiated the positive effects of water-based exercise on body composition and physical function, particularly among overweight and obese individuals, reinforcing its role in rehabilitative care (4). The use of standardized outcome measures such as the VAS and CAIT scores provided a reliable and objective means of assessing treatment efficacy. These tools allowed for precise tracking of pain reduction and functional improvements, supporting clinical decisions throughout the rehabilitation period. Traditional land-based rehabilitation is often challenging for obese individuals due to increased joint stress and mobility limitations. Hydrotherapy provides a low-impact alternative, reducing weight-bearing load while facilitating muscle strengthening and balance retraining. Studies by Pippi et al. support hydrotherapy's role in improving metabolic health and promoting weight loss in overweight individuals, further enhancing its suitability for obese CAI patients (2). Zhu et al.'s systematic review also confirmed the positive impact of water-based exercise on body composition (4). This case underscores the importance of individualized rehabilitation strategies for obese CAI patients. Hydrotherapy enabled progressive functional improvements without exacerbating symptoms, proving to be a viable alternative to traditional rehabilitation. Given its benefits in reducing pain, enhancing stability, and supporting weight management, hydrotherapy should be considered a key modality in CAI rehabilitation, particularly for obese patients with mobility restrictions.

CONCLUSION

This case report highlights hydrotherapy's success in rehabilitating a 29-year-old obese female with chronic ankle instability (CAI). Pain reduction (VAS score: 7/10 to 3/10) and improved stability (CAIT score: 17 to 29) demonstrate its clinical efficacy. The use of hydrotherapy

enabled safe, low-impact ankle rehabilitation through buoyancy-assisted movement and water resistance, particularly beneficial in cases where land-based rehabilitation is limited by obesity-related joint stress. Given the growing burden of obesity and its impact on musculoskeletal disorders, hydrotherapy presents a viable and patient-friendly alternative to conventional rehabilitation. However, to generalize these findings, further prospective studies with larger sample sizes and control groups are necessary. Such studies will help validate hydrotherapy's effectiveness and guide the development of standardized, evidence-based protocols for managing CAI in obese populations.

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to Prof. Dr. Dobson Dominic, Head of the Department of Sports Medicine & Sports Science at Saveetha Medical College & Hospitals (SIMATS), for his invaluable guidance and support throughout this study. We also extend our deepest thanks to the participants and their families for their cooperation.

REFERENCES

1. Dhillon MS, Patel S, Baburaj V. Ankle Sprain and Chronic Lateral Ankle Instability: Optimizing Conservative Treatment. Foot Ankle Clin. 2023; 28(2):297-307. doi:10.1016/j.fcl.2022.12.006
2. Pippi R, Vandoni M, Tortorella M, Bini V, Fanelli CG. Supervised Exercise in Water: Is It a Viable Alternative in Overweight/Obese People with or without Type 2 Diabetes? A Pilot Study. Nutrients. 2022;14(23):4963. doi:10.3390/nu14234963
3. Javorac D, Stajer V, Ostojic S. Case Report: Acute hydrotherapy with super-saturated hydrogen-rich water for ankle sprain in a professional athlete. F1000Res. 2020; 9:245. doi:10.12688/f1000research.22850.1
4. Haifeng Zhu, Jing Jin, Gaonian Zhao, The effects of water-based exercise on body composition: A systematic review and meta-analysis, Complementary Therapies in Clinical Practice. 2023; 52:101766. doi:10.1016/j.ctcp.2023.101766
5. Kapusta J, Irzmański R. The Impact of Controlled Physical Training with Hydrotherapy on Changes in Swelling and Claudication Distance in Patients with Atherosclerotic Ischemia of the Lower Limbs. Int J Environ Res Public Health. 2022; 19(23):15715. doi:10.3390/ijerph192315715