Articles

Influence of Aqua Aerobics on Arterial Hypertension in a 25-Year-Old Patient

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Abstract: Introduction: Arterial hypertension (AHT) in young adults is a clinical challenge requiring effective non-pharmacological strategies. Objective: To determine the influence of an Aqua Aerobics program on blood pressure in a 25-year-old patient with Stage I AHT. Methodology: A case study with a mixed-method approach and an embedded design was conducted. The intervention lasted eight weeks, with three 45-minute sessions per week divided into two phases (Aqua Dynamic and Aqua Gym). Intensity was monitored using the Borg Scale (12-14 points). Blood pressure values were recorded before, during, and after each session. Results: Following the program, the patient stabilized her blood pressure at 120/80 mmHg, starting from a baseline of 130/90 mmHg. A significant reduction in symptoms (headaches and tinnitus) and improved post-exercise recovery were observed. Conclusion: Aqua Aerobics, as a complementary therapy to pharmacological treatment (Losartan), proved effective in reducing and stabilizing blood pressure levels, enhancing the quality of life and hemodynamic response in the young patient evaluated.

Keywords: Blood pressure, Aquatic environment, Swimming, Hydrostatic pressure, Aqua Aerobics.

Introduction

Currently, arterial hypertension (AHT) represents one of the leading causes of morbidity and mortality worldwide, constituting a critical challenge for public health. In this context, physical activity emerges as an essential intervention in blood pressure management. According to Diaztagle (2022), AHT is a problem of vast prevalence in which a considerable proportion of affected individuals are unaware of their condition, increasing the risk of fatal outcomes without prior manifestations.

This cardiovascular risk is complicated by factors such as sedentary lifestyle, obesity, and dysregulation of the renin-angiotensin-aldosterone system. Therefore, hydrotherapy or aquatic therapy, defined by Martínez et al. (2025) as an exercise program performed in immersion, takes advantage of the physical properties of water to facilitate movement and optimize functional rehabilitation. This modality capitalizes on buoyancy and temperature to reduce joint load and enhance health.

Recent scientific literature corroborates the effectiveness of these interventions. Kruel et al. (2021) evaluated blood pressure responses in hypertensive women practicing water aerobics, concluding that both continuous and interval protocols are safe and present no significant differences in blood pressure response. These findings validate aquatic practice as an alternative with high cardiovascular safety for populations with chronic diseases.

Likewise, research by Gutiérrez et al. (2020) demonstrated that a 16-week moderate physical exercise program significantly reduces both systolic blood pressure (SBP) and diastolic blood pressure (DBP). This positive impact is crucial in young populations, where AHT requires management that avoids excessive dependence on pharmacological agents. Villarreal et al. (2023) emphasize that overweight is the strongest risk factor, recommending healthy lifestyles from early ages.

On the other hand, authors such as Álvarez (2025) have demonstrated the viability of aqua fitness programs to promote healthy habits in communities with a prevalence of diabetes and hypertension. Despite these benefits, Martins et al. (2009) warn that a considerable portion of the hypertensive population does not possess the desirable profile of regular physical activity practice. This justifies the need to validate specific low-impact protocols that foster treatment adherence.

Finally, this research is justified by providing evidence on the efficacy of Aqua Aerobics in a 25-year-old young patient. Theoretically, the study is based on the concept of Chronic Adaptation by volume Overload (Maron and Thompson, 2020), where immersion increases central venous return and decreases sympathetic tone. The general objective is to determine the influence of this practice on AHT, evaluating hemodynamic response and clinical symptomatology during the 2025 management period.

Materials and Methods

Study Design

The research was developed under a mixed-method approach with an embedded design (DIAC) of descriptive-propositive type. According to Martínez et al. (2025), this model allows the integration of quantitative data from blood pressure measurements with the patient's qualitative perception of her well-being.

As this was a single case study, longitudinal observation was prioritized over eight weeks, allowing the identification of specific physiological adaptations in response to the aquatic exercise stimulus.

Participant and Ethical Considerations

The unit of analysis was a 25-year-old female with a diagnosis of Stage I Arterial Hypertension (130/90 mmHg) and a history of sedentary behavior. In accordance with the protocols of the American College of Sports Medicine (ACSM, 2022), informed consent was obtained for participation and data publication. The patient maintained her pharmacological treatment with Losartan (50 mg/day) and a low-sodium diet to ensure that observed changes could be attributed to the Aqua Aerobics intervention.

Data Collection Instruments

For the quantification of systolic and diastolic blood pressure, a medical-grade digital sphygmomanometer was employed, following the monitoring guidelines of the American Heart Association. Exercise intensity was measured using the Borg Scale (6-20), a tool validated by Kruel et al. (2021) for controlling internal load in aquatic exercises. Additionally, a clinical log was used to record symptoms such as headaches and tinnitus before and after each session.

Intervention Protocol (Aqua Aerobics Program)

The designed program was implemented with a frequency of three weekly sessions of 45 minutes each. Following the structure proposed by Martins et al. (2009), each session was divided into three phases: warm-up (10 min), aerobic core "Aqua Dynamic" (25 min), and cool-down "Aqua Gym" (10 min). Intensity was maintained within a range of 12 to 14 points on the Borg Scale, ensuring moderate aerobic work that favored the hypotensive response.

Quantitative data processing was performed using descriptive statistics, employing frequency tables and line graphs to observe blood pressure trends.

As suggested by Zhou and Yázigi (2023), data triangulation allowed the contrast of physical measurements with the evolution of the patient's perceived quality of life. This comprehensive analysis facilitated the validation of the protocol as a coadjuvant strategy in the management of juvenile arterial hypertension.

Results

After conducting the eight-week intervention and hemodynamic control tests, the following data based on the patient's response to effort were obtained and calculated:

Optimal Time (Optimal Blood Pressure): The lowest blood pressure reading achieved after the "Aqua Dynamic" phase.

Table 1.
Comparison of Blood Pressure Values (Pre-test vs. Post-test)

Variable	Pre-test (Week 0)	Post-test (Week 8)	Difference
Systolic Blood Pressure	130 mmHg	120 mmHg	-10 mmHg
Diastolic Blood Pressure	90 mmHg	80 mmHg	-10 mmHg
Resting Heart Rate	82 bpm	74 bpm	-8 bpm
Symptom Perception (Headaches)	Frequent (3-4 times/week)	Absent	100% reduction

Note. Final values show stabilization within normal ranges according to AHA criteria.

The effectiveness of these blood pressure changes is attributed to the precise dosing of effort during sessions. Table 2 describes the structure of the biphasic protocol used, highlighting that the majority of effective work time was maintained within a moderate intensity range (12-14 points on the Borg Scale).

This organization allowed maximizing the benefits of hydrostatic pressure without compromising the participant's cardiovascular safety.

Exercise/Running intensity: The high-intensity phases in the water (Aqua Dynamic) were carried out seeking the greatest possible metabolic expenditure. The patient managed to maintain an intensity of 14 points on the Borg Scale ("Somewhat hard") without reporting hypertensive spikes.

Table 2.
Applied Biphasic Intervention Protocol

Phase	Principal Activity	Duration	Intensity (Borg)
Warm-up	Joint mobility and displacements	10 min	9 - 10
Warm-up	Joint mobility and displacements	10 min	9 - 10
Aqua Dynamic	Aerobic exercises of hydrodynamic resistance	25 min	12 - 14
Aqua Gym	Localized muscle toning and stretching	10 min	11 - 12
Total Session		45 min	Moderate

Note: Frequency of 3 weekly sessions. Intensity monitored to avoid Valsalva maneuver.

The 10-mmHg reduction observed in Table 1 is clinically significant, as according to the literature, a decrease of even 5 mmHg in systolic pressure drastically reduces the risk of cerebrovascular events in the long term.

Result: *118/78 mmHg (recorded in week 7).*

Fatigue Index / Hemodynamic Recovery:

Pre-test (Baseline): The patient started with 130/90 mmHg. After effort, recovery to baseline values took more than 30 minutes.

Post-test (End of program): The patient stabilized her blood pressure at 120/80 mmHg. Post-exercise recovery time decreased significantly, achieving stable levels in less than 15 minutes after the session.

Points observed during protocol execution:

Recovery Control: Following the 24-second recovery logic of sprint tests, the pause between blocks of aquatic exercises was monitored. The patient showed a recovery heart rate 15% more efficient in the final phase of the study compared to the initial phase.

Verbal Information and Monitoring: Constant feedback was provided to the patient regarding her respiratory technique and execution time (every 5 and 10 minutes during the aerobic core) to avoid the Valsalva maneuver, which is contraindicated in hypertensive patients.

Incidents and Reliability: No falls or trips occurred during sessions in the aquatic environment. The buoyancy of water (Archimedes' Principle) allowed the patient to perform jumping movements and displacements that on dry land generated premature fatigue and headaches.

Symptomatology: At baseline (Pre-test), the patient reported headaches and tinnitus in 80% of sessions. At the end of the study (Post-test), the incidence of these symptoms was reduced to 0%, confirming the safety of the protocol.

Discussion

The reduction of blood pressure to levels of 120/80 mmHg observed in this case study coincides with the findings of Gutiérrez et al. (2020), who demonstrated that constant moderate exercise is a significant reducer of SBP and DBP in women. The particularity of this case lies in the patient's age (25 years), demonstrating that the hypotensive response is not exclusive to older adults. These data reinforce the idea that early intervention can mitigate target organ damage.

Unlike common concerns about intensity, this protocol demonstrated total cardiovascular safety. As noted by Kruel et al. (2021), there are no significant differences in blood pressure responses between continuous and interval protocols in water, which allowed the application of the "Aqua Dynamic" phase with confidence. The absence of hypertensive peaks during the eight weeks suggests that hydrostatic pressure acts as a protective factor and facilitator of central venous return.

The disappearance of symptoms such as headaches and tinnitus aligns with the perspective of Martínez et al. (2025), who validated that aquatic exercise notably improves the perception of health-related quality of life. The aquatic environment not only benefited the patient's hemodynamics but also reduced orthopedic stress. This is fundamental for treatment adherence in young patients who, according to Martins et al. (2009), typically present physical activity levels below recommended values.

Finally, the success of the intervention is grounded in the mechanism of chronic adaptation by volume overload described by Maron and Thompson (2020). Prolonged immersion and regular aerobic exercise induced a decrease in sympathetic tone, allowing sustained blood pressure stabilization. This case study provides practical evidence for Aqua Aerobics to be considered a formal clinical prescription tool, complementary to standard pharmacological treatment in juvenile hypertension.

This suggests that this training regimen could have induced certain positive physiological adaptations because of the high requirements and intensity of the exertions, leading to enhanced anaerobic power and capacity, as well as an improved fatigue index.

The fatigue index was one of the variables that improved, but despite having a significant improvement percentage, it remains low compared to other studies, so it is necessary to carry out better preparation to increase the repeated sprint ability (RSA).

Conclusions

The Aqua Aerobics program proved to be an effective non-pharmacological intervention for blood pressure regulation in a 25-year-old young patient. After eight weeks of intervention, blood pressure stabilization at 120/80 mmHg was achieved, starting from a baseline of 130/90 mmHg. This finding confirms that exercise in an aquatic medium, thanks to hydrostatic pressure, potentiates the hypotensive response and improves the efficiency of the cardiovascular

system in populations with Stage I hypertension.

It is concluded that the applied methodology (Aqua Dynamic and Aqua Gym phases) offers high cardiovascular safety, completely eliminating initial clinical symptomatology such as headaches and tinnitus. The absence of adverse effects and the improvement in post-exercise recovery validate Aqua Aerobics as an ideal low-impact modality for patients requiring hemodynamic control without the orthopedic stress of land-based exercise. The Borg Scale (12-14 points) proved to be a precise and reliable intensity monitoring instrument.

Finally, the results suggest that the integration of aquatic exercise with pharmacological treatment (Losartan) favors a positive chronic adaptation, optimizing venous return and reducing sympathetic tone. The implementation of this standardized protocol in public health programs and physical rehabilitation centers is recommended. This case study lays the foundation for future research exploring the dose-response relationship of aquatic exercise in young adults with cardiovascular risk factors.

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The authors declare having no conflicts of interest.

Declaration of participation in the research by the authors:

The authors participated in the data collection process, in the diagnosis of the intervention, and in the post-intervention.