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Does aquatic thermal therapy improve quality of life in subjects who underwent total hip replacement? A retrospective pilot study.

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Abstract:	Aquatic thermal therapy is prescribed for its antalgic, muscle relaxant, and trophic properties, as well as anti-edemigenous and anti-inflammatory effects. Currently, the management of persons with total hip replacement (THR) consists of multiple pharmacologic and non-pharmacologic therapies, which include therapeutic exercise (joint-specific exercises for strength and range of motion, stretching, proprioceptive exercises and functional training), physical therapies and education. Our hypothesis is that therapeutic exercise in thermal water would improve functional outcome. The aim of the study was to assess thermal water rehabilitation efficacy on pain, mood and quality of life. We enrolled 11 subjects (mean age of 70.55±14 years) with Total Hip Replacement (THR) after early hospital discharge at a residential rehabilitation facility. All participants underwent a standardized combined land-based and hydrokinesitherapy rehabilitation program for 2 consecutive weeks. Clinical data were collected at admission and discharge form the rehabilitation facility; scoring from scales on pain, anxiety and quality of life were collected at admission, discharge, 3 and 6 months from surgery. Quality of life, anxiety, mood and pain improved after treatment and persisted at 6 months' follow-up. These preliminary data demonstrate that thermal hydrokinesitherapy can positively influence functional recovery in orthopedic post-surgical patients. Further randomized controlled trials are mandatory to consolidate this finding.
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Abstract

Aquatic thermal therapy is prescribed for its antalgic, muscle relaxant, and trophic properties, as well as anti-edemigenous and anti-inflammatory effects. Currently, the management of persons with total hip replacement (THR) consists of multiple pharmacologic and non-pharmacologic therapies, which include therapeutic exercise (joint-specific exercises for strength and range of motion, stretching, proprioceptive exercises and functional training), physical therapies and education. Our hypothesis is that therapeutic exercise in thermal water would improve functional outcome. The aim of the study was to assess thermal water rehabilitation efficacy on pain, mood and quality of life. We enrolled 11 subjects (mean age of 70.55±14 years) with Total Hip Replacement (THR) after early hospital discharge at a residential rehabilitation facility. All participants underwent a standardized combined land-based and hydrokinesitherapy rehabilitation program for 2 consecutive weeks. Clinical data were collected at admission and discharge form the rehabilitation facility; scoring from scales on pain, anxiety and quality of life were collected at admission, discharge, 3 and 6 months from surgery. Quality of life, anxiety, mood and pain improved after treatment and persisted at 6 months' follow-up. These preliminary data demonstrate that thermal hydrokinesitherapy can positively influence functional recovery in orthopedic post-surgical patients. Further randomized controlled trials are mandatory to consolidate this finding.

Introduction

Thermal water physiotherapy reduces postural instability and risk of falling in elderly subjects, with a positive impact on quality of life (Vivas et al. 2011), and maximizes rehabilitative treatment efficacy in different musculoskeletal disorders (Devereux et al. 2005; Masiero 2008; Arnold et al. 2008; Paoloni et al. 2017; Mazzoli et al. 2017; Masiero et al. 2018). Thermal rehabilitative therapies provide also a favorable social environment (Miller and Kaptchuk 2008). Previous studies demonstrated anti-edemigenous, anti-inflammatory, muscle relaxant, muscle trophic and antalgic physical properties of thermal waters (Masiero 2008; Masiero et al. 2011, 2018; Paoloni et al. 2017; Mazzoli et al. 2017). Current evidence indicates that aquatic thermal therapy may have the potential to decrease cortisol levels in the short term and to improve cortisol awakening response in healthy subjects (Toda et al. 2006).

Our hypothesis is that intensive thermal water rehabilitation contributes to recovery after total hip replacement arthroplasty (THR). Main outcome was improvement of quality of life; secondary outcomes were pain control, anxiety and mood reduction.

Materials and methods

Eleven subjects with total hip replacement (THR) were subsequently recruited and enrolled among participants to a thermal water standardized rehabilitation program at a residential rehabilitation facility [Thermal Rehabilitation Center in Abano Terme (Italy)].

Inclusion criteria were total hip replacement for primary hip osteoarthritis 15 to 30 days before enrollment and age between 45 and 90 years. Exclusion criteria were surgical open wounds, cardiovascular (included phlebitis or deep vein thrombosis), pulmonary, metabolic (e.g. complicated diabetes), cutaneous, neoplastic and mental disorders. Different surgical operators were not an exclusion criterion.

Rehabilitation program was performed in hyper-thermal “salso-bromo-iodic” water pools.

All participants underwent a thorough medical examination before and at the end of the rehabilitation program.

Treatment consisted of six sessions/week for 2 consecutive weeks of two and half hours of land-based (1 hour and a half) and hydrokinesitherapy (1 hour) with active and passive joint mobilization, respiratory and functional re-education exercises, gait and balance training, resistance exercise, and power training associated with physical therapy (electrotherapy and low-level-laser therapy). An educational program was provided to participants and

families (Musumeci et al. 2018). All subjects were evaluated the day of admission (T0) and at the end of treatment (T1); after 3 months (T2) and 6 months after the end of the treatment (T3) scales scores were collected by telephone interview.

At T0 and T1 collected parameters were: Range of Motion (ROM) of hip flexion/abduction and Harris Hip Score (HHS), a clinician-based outcome measure for the assessment of the results of the hip replacement (Nilsdotter and Bremander 2011). At T0, T1, T2 and T3 self-administered scale scores were collected: Numeric Pain Rating Scale (NRSp) measurement for pain assessment (where zero describes no pain and 10 severe pain) (Huskisson 1974); Numeric Mood Rating Scale (NRSm) measurement for mood assessment (where zero describes severe depression and 10 euphoria); Numeric Anxiety Rating Scale (NRSa) measurement for anxiety assessment (where zero describes no anxiety and 10 severe anxiety); EQ5D Euroquol Quality of Life Scale (Eq-5D) (Balestroni and Bertolotti 2015).

A preliminary descriptive analysis was performed to check the normal distribution of participants' data using Shapiro-Wilk test. The Mann-Whitney test (T0 vs T1) for clinical tests and Friedman test (T0 vs T1 vs T2 vs T3) for self-administered scales was used to determine any significant differences between time points. Significance was set at $p < 0.05$.

Results

Average age of participants was 70.55±14.03 years (5 males). The ANOVA analysis showed a significant improvement, more evident at T1 compared with T0, which persisted at T2 and T3 for NRSa (T1>T0: p=0.0305; T2>T0: p= 0.0453; T3>T0; p=0.0447), NRSm (T1>T1: =p= 0.0435; T2>T0: p=0.037; T3>T0; p=0.0501) and EQ5D (T1>T0: p=0.0027; T2>T0: p=0.013; T3>T0: p=0.024). The HHS score before (T0) and after treatment (T1) showed a statistical improvement (p=0.0374). There was a non-statistically significant improvement in hip flexion and abduction between T0 and T1. There was no adverse event during spa treatment. Results are reported in table 1 and figure 1.

Discussion

This study provides evidence of long-term improvement of quality of life of subjects with THR after aquatic thermal therapy. Currently, the management of persons with THR consists of multiple pharmacologic and non-pharmacologic therapies, which include therapeutic exercise (joint-specific exercises

for improving strength and range of motion, stretching, proprioceptive exercises and functional training) physical therapies and education (Wijnen et al. 2018).

Our results support the role of aquatic thermal therapy in the rehabilitation process of this population. Thermal hydrokinesitherapy may improve mood, anxiety and stress management, reduce fatigue and pain and thus facilitate rehabilitation (Oláh et al. 2011; Musumeci et al. 2018) without no reported side effects. Stress has a direct association with fatigue, which relates to pain (Rapolienė et al. 2016). In fact, mineral bathing appears to be more efficient to relieve pain than non-mineral baths or muds, likely due to a specific effect of the mineral components of thermal water (Morer et al. 2017). Mineral water has also a crucial role in the rehabilitation intervention due to the potential to stimulate the healing process through minerals and gaseous compounds (Masiero 2008). Clinical experience suggests that density, hydrostatic pressure, buoyancy, viscosity and thermodynamics of aquatic thermal therapy contribute to the rehabilitation process. The long-term improvement in quality of life scores (Rahmann et al. 2009; Villalta and Peiris 2013) further supports the integration of thermal hydrokinesitherapy in THR rehabilitation.

The main limitation of the study was the lack of a control group and the selection bias. Indeed, we are confident of the impact of thermal water therapy in light of the clear-cut improvements and their long-term persistence, which calls for randomized controlled trials to demonstrate our preliminary results.

Conclusions

The lack of side effects and the easiness of providing intervention support the develop of large randomized clinical trial, which are mandatory to confirm that thermal aquatic rehabilitation might become a useful strategy in the rehabilitation program of total hip replacement. In conclusion, thermal settings appear promising rehabilitation environments for people with orthopedic musculoskeletal disability.

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Competing interests

Authors have no conflicts of interest or any financial interest. All authors confirm that the material has not been and will not be submitted for publication elsewhere.

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Figure Caption

Figure 1. Mean value of self-administered scales score pre and post treatment T0 vs T1 and 3 (T2) and 6 (T3) months follow-up. Numeric Pain Rating Scale (NRSp), Numeric Mood Rating Scale (NRSm), Numeric Anxiety Rating Scale (NRSa), EQ5D Euroqool Quality of Life Scale (Eq-5D).

Table 1

	NRSp			NRSa			NRSm			EQ5D		
	Mean	**SD**	**p**	**Mean**	**SD**	**p**	**Mean**	**SD**	**p**	**Mean**	**SD**	**p**
			vs T0			> T0			> T0			> T0
T0	2.81	2.52	ns	2.36	2.97		4.54	3.11		0.53	0.20	
T1	2.01	2.09	ns	0.818	1.53	0.030	6.72	2.72	0.043	0.67	0.11	0.002
T2	2.45	2.54	ns	2.45	2.80	0.045	7.36	1.62	0.037	0.74	0.27	0.01
T3	2.36	2.33	ns	2.36	2.69	0.045	7.45	1.63	0.050	0.77	0.27	0.02

Table 1. Friedman test for sSelf-administered scales scores for quality of life and pain pre- and post-treatment T0 vs T1 and at 3 (T2) and 6 (T3) months follow-up: Numeric Pain Rating Scale (NRSp), Numeric Mood Rating Scale (NRSm), Numeric Anxiety Rating Scale (NRSa), and EQ5D Euroqool Quality of Life Scale (Eq-5D).

Figure 1

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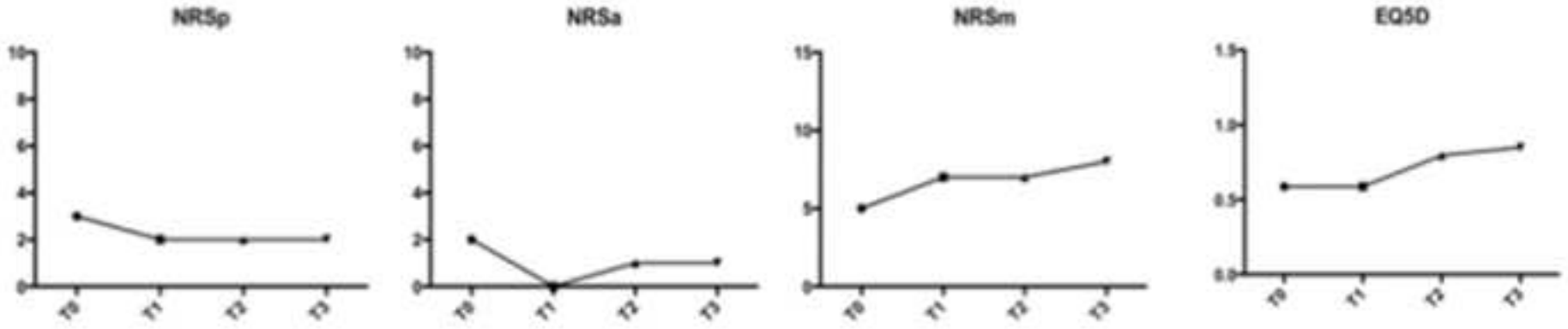

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