



Caso clínico

Hydrokinesitherapy program using the Halliwick method on strength endurance and flexibility in a person with poliomyelitis sequelae

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Abstract

This case study attempts to determine the effect of a hydrokinesitherapy program by means of the Halliwick method on physical fitness in a female aged 35 years with poliomyelitis sequelae. The intervention followed sixteen weeks of hydrokinesitherapy during 70 minutes, five times a week, where we carried out exercises from the Halliwick method. There was an assessment both before and after the application. Strength endurance and flexibility were determined according to a senior fitness test protocol. The results showed positive improvements when carrying out the exercises from the Halliwick method and the percentage change ($\Delta\%$) of strength endurance increase 361.5% in the right arm and 300% in the left arm. Flexibility increased 2 cm in the right shoulder and 10 cm in the left shoulder. In conclusion the subject was able to improve the performance of Halliwick exercises while showing an increase in strength endurance and flexibility.

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Key words: *Poliomyelitis. Hydrokinesitherapy. Physical Fitness.*

Introduction

According to the World Health Organization (WHO), the poliomyelitis eradication initiative began in 1988 when 350,000 poliomyelitis cases in 125 countries were reported. The application of this initiative resulted in the endemic transmission of only 223 poliomyelitis cases in 3 countries in 2012¹. However,

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HIDROCINESITERAPIA USANDO EL MÉTODO HALLIWICK SOBRE LA RESISTENCIA A LA FUERZA Y FLEXIBILIDAD EN PERSONA CON SECUELAS DE POLIOMIELITIS

Resumen

El estudio de caso, determina el efecto de un programa de hidrocinesiterapia usando el método Halliwick sobre la resistencia a la fuerza y la flexibilidad en una mujer de 35 años con secuelas de poliomiéltis. La intervención consistió en 16 semanas de hidrocinesiterapia de 70 minutos, 5 veces por semana, mediante el método Halliwick evaluándolo antes y después; La resistencia a la fuerza y la flexibilidad se determinaron por el protocolo senior fitness test. Se mejoró el desempeño en los ejercicios del método Halliwick y el porcentaje de cambio ($\Delta\%$) en la resistencia a la fuerza (361.5 % brazo derecho y 300% brazo izquierdo), la flexibilidad se incrementó 2 cm en el hombro derecho y 20 cm en el hombro izquierdo. En conclusión la paciente mejoro el desempeño en el método Halliwick, mostrando incremento en la resistencia a la fuerza y la flexibilidad.

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the prevalence of the post-polio syndrome is estimated to be present in 50% of patients suffering from poliomyelitis with a subsequently stable phase of at least 15 years². There is scientific evidence indicating that there is the presence of sarcopenia and a decrease in neuromuscular functions in post-polio individuals, thus reducing their strength and joint mobility². Moreover, sarcopenia has been identified as a disease that decreases the independence and functional autonomy when it comes to completing everyday activities³. This affects social development and decreases the quality of life in people suffering from post-polio syndrome⁴.

Evidence from cross-sectional studies shows that active lifestyles in post-polio individuals are related to a decrease in musculoskeletal symptoms⁵; also, results of controlled trials focusing on exercises in post-polio population have shown an improvement in physical fit-

ness⁶. Hence, physical exercise following poliomyelitis has been proposed during rehabilitation to reduce musculoskeletal health problems related to sarcopenia⁷.

This research considered the Halliwick method⁸, carried out through hydrokinesitherapy. This form of exercise is especially recommended for people suffering from physical limitations and has become more popular and a preferred method in the last ten years, among people with physical disability. This due to the fact that we take advantage of water properties in order to provide fluidity and a wider range of movement, while decreasing the risk of injuries⁸. The Halliwick concept is a structured learning progress that aims to improve independence in the water and gain better movement control and balance. It involves ten exercises: mental adjustment, release, vertical rotation, lateral rotation, combined rotation, flotation, balance, weathering turbulence, basic movement and fundamental movements^{8,9}. In this context, there is a lack of studies showing the effects of the Halliwick method carried out through hydrokinesitherapy in people with this pathology.

Case report

A female subject aged 35 years with poliomyelitis sequelae volunteered. She was recruited to partake in this case study. The subject had sequels of poliomyelitis with the following physical characteristics: legs immobility and spasticity especially on the left side, a 50 degree scoliosis and two spinal surgeries performed and wheelchair use. She had not carried out any physical exercise in the last six months and does not have any sort of acute or chronic complication that would hinder water exercise. The present study followed the ethical principles regarding human experimentation proposed by the Helsinki declaration.

The subject completed the activities during a four-month period, five times a week, and 90 minute sessions comprised of 10 minutes of warm-up, 70

minutes performing the hydrokinesitherapy program using the ten exercises from the Halliwick method (mental adjustment, release, vertical rotation, lateral rotation, combined rotation, flotation, balance, weathering turbulence, basic movement and fundamental movements)^{8,9}. Then, a 10 minute cool down followed.

In order to determine physical fitness, we performed the senior fitness assessment to evaluate strength endurance and flexibility composed of the following tests: Arm curl test: to evaluate upper-body strength endurance. It was assessed scoring the numbered of biceps curls than were completed in 30 seconds holding a hand weight (3.63 kg). The back scratch test: to evaluate upper-body (shoulder) flexibility by scoring the number of centimeters reached with one hand over the shoulder and one up the middle of the back¹⁰.

Discussion

Qualitative statistical analysis on the Halliwick method was used to score the performance of the exercises under the categories: Not Achieved (NA), Average (A), Good (G), Very Good (VG), and Excellent (E). Descriptive statistical procedures are presented previous to the testing and post-testing as the percentage change ($\Delta\%$) was calculated $[(\text{Media post} - \text{Media pre})/\text{Media pre}] \times 100$.

The strength endurance results assessed with the arm curl test were: 13 biceps curls in right arm that the subject completed in 30 seconds and 15 in left arm pretest at the baseline and at the end posttest of the 16-week were 60 with the right arm and 60 with the left arm; The back scratch test: to evaluate upper-body flexibility were 2 cm right shoulder and -8 cm left shoulder pre-test and 0 cm right shoulder and -18 cm left shoulder post-test. As shown in Figure I, the percentage change ($\Delta\%$) after hydrokinesitherapy showed improvements in subject values on strength endurance and flexibility.

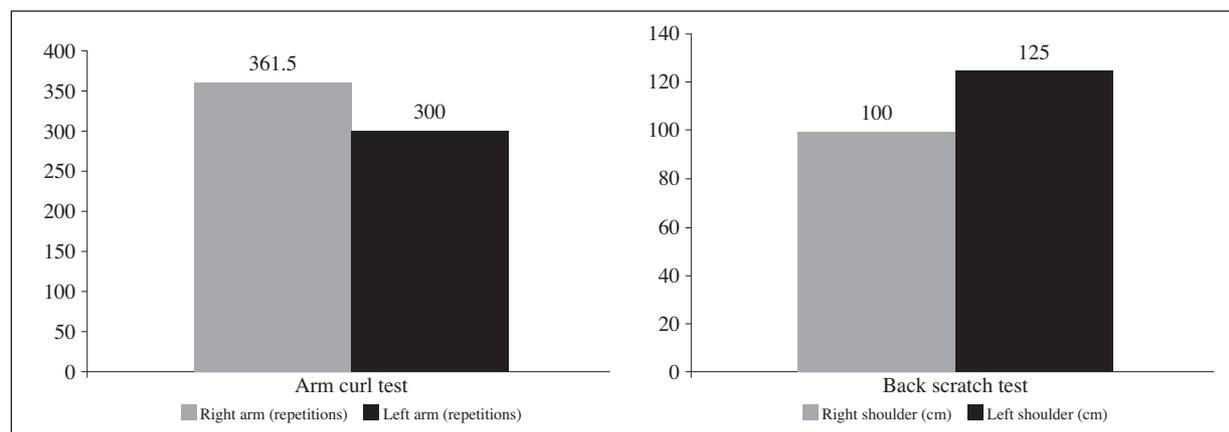


Fig. 1.—Percentage of changes ($\Delta\%$) of strength endurance assessed with arm curl test and upper-body flexibility assessed with back scratch test of senior fitness (Rikli & Jones, 2001); Assessed after 16 weeks of hydrokinesitherapy using the method of Halliwick.

| Variables | Pretest | Posttest |
|-----------------------|---------|----------|
| Mental adjustment | A | G |
| Release | A | G |
| Vertical rotation | NA | VG |
| Lateral rotation | A | G |
| Combined rotation | A | G |
| Flotation | A | G |
| Balance | NA | E |
| Weathering turbulence | NA | G |
| Basic movement | NA | G |
| Fundamental movements | NA | G |

Fig. 2.—Performance of Halliwick method exercise before and after 16 weeks of hydrokinesitherapy (Weber-Nowakowska et al., 2011). Categories assessed: not achieved (NA), average (A), good (G), very good (VG), excellent (E).

The results of the ten exercises from the Halliwick method are presented in Figure II; The 10 exercises were assessed by the instructor⁸, according to subject performance on the categories of Not Achieved (NA), Average (A), Good (G), Very Good (VG), and Excellent (E).

The main findings of this present research were that sixteen weeks of hydrokinesitherapy were able to improve the strength endurance and flexibility and the exercises performed following the Halliwick method by a female aged 35 years, with poliomyelitis sequelae. These findings are corroborated with controlled trials focusing on other exercise modalities such as conventional therapy and aerobic exercise⁶. In the physical therapy area, water exercise has been proposed during the rehabilitation of poliomyelitis sequelae⁷, due the benefits that the water environment provides in preventing neuromuscular function deterioration such as spasticity. Moreover, physical fitness should be monitored to avoid musculoskeletal problems related to poliomyelitis sequelae^{2,3}.

Regarding the assessment of physical fitness, the senior fitness test manual offers new tools to aid in the application of the senior fitness test. This includes expanded information on ways to modify test protocols for population with limiting conditions such as people with poliomyelitis sequelae. In addition to this, the senior fitness test is inexpensive, validated, easy to apply, replicable and the test provides information of certain freedom of action⁹.

Although this study had limitations, due to the fact that it was designed as a case study, there are a few re-

ferences on the Halliwick method as aquatic physical therapy¹⁰. Hopefully these results will contribute to the clarification and better understanding of the effects of hydrokinesitherapy on physical fitness in population with poliomyelitis sequelae.

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