Hidrotherapy: coadjuvant treatment to kinesiotherapy in patients with sequels after stroke

Hidroterapia: tratamento coadjuvante à cinesioterapia em pacientes com seqüelas, pós acidente cerebral vascular

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RESUMO

Objetivo. O objetivo deste estudo foi comparar a evolução das atividades de vida diária dos pacientes com seqüela de acidente vascular cerebral (AVC) submetidos a hidroterapia, cinesioterapia convencional e sem intervenção fisioterapêutica. Método. Foi selecionada uma amostra de 152 pacientes, por ordem de chegada, de ambos os sexos, submetidos às técnicas de hidroterapia e cinesioterapia clássica, durante o período de um ano. As sessões de hidroterapia e cinesioterapia clássica tiveram duração de 45 minutos, freqüência mínima de 03 vezes por semana. A cada trimestre foi realizada avaliação da atividade funcional, com finalidade de identificar índice de dependência, semi-dependência e independência nas atividades de vida diária. A análise da atividade funcional foi verificada mediante a aplicação do índice de Barthel. Resultado. Dos 152, 118 preencheram os critérios para análise; foram divididos em três grupos: 72 (60%) com cinesioterapia convencional, 32 (27,1%) com e 14 (11,9%). O grupo cinesioterapia convencional e hidroterapia obteve melhora no grau de independência e seqüelas motoras mais leves (p=0,001) e o déficit neurológico foi maior no grupo sem tratamento que nos outros (p=0,01). Conclusão. A hidroterapia pode ser considerada bom procedimento fisioterápico coadjuvante na abordagem de pacientes com seqüelas de AVC.

Unitermos. Acidente Cerebrovascular, Hidroterapia, Cinesioterapia.
Citação. Paizan NLM, Silva R, Borges MA. Hidroterapia: tratamento coadjuvante à cinesioterapia em pacientes com seqüelas, pós acidente vascular encefálico.

SUMMARY

Objective. The aim of this study was to compare the evolution of daily life activities of patients suffering from sequels of strokes who were submitted to hydrotherapy, conventional kinesiotherapy and those with no physiotherapeutic intervention. Method. A total of 152 patients of both genders were selected according to their arrival in the service and were submitted to hydrotherapy in isolation or together with classical kinesiotherapy, over six months. The 45-minute hydrotherapy and classical kinesiotherapy sessions were performed at least three times weekly. Functional activity was evaluated every three months to identify: the dependence, semi-dependence or independence on routine activities. Analysis of the functional activity was assessed by means of the Barthel index. Results. Of the 152 patients, 118 satisfied inclusion criteria. The participants were divided into three groups: 72 (61%) underwent conventional kinesiotherapy, 32 (27.1%) hydrotherapy followed by conventional kinesiotherapy and 14 (11.9%) had no physiotherapeutic interventions. The conventional kinesiotherapy with hydrotherapy group improved in relation to both the degree of independence and lighter motor sequels (p=0.001). The neurological deficit remained greater in the non-treatment group than in the others (p=0.01). Conclusion. The hydrotherapy may be considered a good coadjuvant procedure for patients with sequels due to stroke.

Keywords: Stroke, Hydrotherapy, Kinesiotherapy.
Citation. Paizan NLM, Silva R, Borges MA. Hidrotherapy: coadjuvant treatment to kinesiotherapy in patients with sequels after stroke.

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Artigo Original
Recebido em: 13/02/2009
Revisado em: 14/02/2009 a 25/10/2009
Aceito em: 26/10/2009
Conflito de interesses: não

Research developed in Centro Universitário de Rio Preto – UNIRP, São José do Rio Preto-SP, Brazil.

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INTRODUCTION

Patients after stroke have a great number of physical, psychological and social problems[1]. The National Stroke Association estimates about 730,000 new or repeated cases annually. The incidence increases rapidly with age: two thirds of the cases affect over 65-year-olds; after the age of 55 years old, the risk doubles every 10 years. In the United States, the proportion of stokes is greater in men than in women and higher in Black people than in Caucasians[2,3].

Ischemic, thrombotic or embolic strokes account for 80% of the cases and hemorrhagic stroke for 20%[4]. Stroke impair the descending neural pathways due to lesions of the upper motoneurons. If a stroke occurs in the medium cerebral artery, the most common location for this type of lesion, cortico-brainstem-spinal tract and corticocerebellar connections will be affected[5].

After encephalic lesions, alterations in the synapses, in the functional reorganization of the central nervous system and alterations related to the activity of neurotransmission regulation promote lesion recovery through a process called neuroplasticity[6].

Thus, encephalic injury leads to the loss of neural response to stimulation making it difficult to learn new things and impairs recovery of functions. Factors that can affect this normal process are: age, characteristics of the lesion, the effect of the experience, the pharmacological effect and the effect of training[7-10].

The most common physical consequence of strokes is hemiplegia, defined as complete paralysis of the superior and inferior limbs on one side of the body[11].

Spasticity and its treatment is a great problem after strokes, as patients feel uncomfortable. This spasticity varies with time and does not respond to treatment. Recent studies contest an old belief that spasticity is inversely related to voluntary movement[7,12].

The development of new research and the involvement of multidisciplinary teams allow a global approach to patients. Therapeutic exercises are based on posture exercises, training exercises for walking, stationary and dynamic balance and orthetic appliances, breathing exercises, bronchial hygiene resources, guidance on transfer and correct positioning, muscle stretching exercises, global mobilization exercises, passive exercises and active free and resisted exercises[13-15].

Treatment in a swimming pool is especially useful for patients who have many weak muscles, with floating used to provide graduated exercises to strengthen the muscles[16,17].

Among the physical properties of the water, floating provides an upward force that acts in opposition to the gravitational pull and is considered an important benefit in the rehabilitation of stroke victims. It provides weight relief, promoting functional capacities in the water and facilitates the management of these patients. On the other hand, it causes instability with the necessity of using equipment, such as floats and other materials, depending on the purpose of the exercises[17].

Immersion in a heated swimming pool will reduce muscular tension, preventing articular restrictions; the hotter the water, the better. The basic use of floating is the initial strengthening of weak muscles, a reduction in the biomechanical stress, support of part of the body mass and to assist and resist movement[18,19].

There is a hypothesis that performing hydrotherapy before kinesiotherapy may improve the treatment of patients due to the benefits of heated water such as the reduction in muscular tension, improved balance, increased muscle strength, reduction in the tonus and increases in the amplitude of movements.

To test this hypothesis, this study aimed at evaluating the evolution of functional motor capacity of patients with sequels caused by strokes using kinesiotherapy alone and hydrotherapy followed by kinesiotherapy as therapeutic options. A group of patients who did not receive any treatment was used as a control.

METHOD

Sample

The study sample comprised patients of both genders suffering hemiplegia due to stroke, who were prospectively selected by order of arrival in the service. A total of 152 patients were evaluated; of these, 118 complied with the inclusion criteria with 40 being women. The study was approved by the Local Ethics Committee and all the patients signed an informed consent.

Assessment

A physical neurological examination was used to evaluate the patients' skeletal muscle conditions and relative and absolute indications and contraindications by means of hydrotherapeutic techniques: Halliwick and Bad Ragaz, proprioceptive neuromuscular facilitation (Kabat) and the Bobath method[20-22].

The participants were subdivided in three groups: a group was submitted to kinesitherapy alone, a group to hydrotherapy followed by kinesitherapy and the third group, the control group, did not receive any type of physical therapeutic treatment.

The patients were submitted to both kinesiotherapy and hydrotherapy techniques in the Physiotherapy Service of the Institute of Higher Education of Catanduva (Fafica), between January 2003 and 2004.

The physical therapeutic treatment was applied to the patients in two ways: in one group, classical kinesiotherapy (Kabat and Bobath) was utilized in three weekly sessions over 6 months, and for the second group, hydrotherapy (Halliwick and Bad Ragaz) followed by classical kinesiotherapy (Kabat and Bobath) was used in three weekly sessions also over 6 months.

The patients submitted to treatment (both the kinesitherapy only group and the hydrotherapy with kinesitherapy group) were all treated in the same teaching clinic and received the same type of treatment under the same supervision albeit by different students.

The Barthel index[23] was used every three months, for all patients aiming at identifying their functional conditions. The results were stored on a Microsoft Excel spreadsheet and analyzed using the Minitab Mtb[13] computer program.

Statistical Analysis

The chi-squared test was used for the statistical analysis of the age and gender distribution among the three groups and an "improvement index" was created, which corresponds to the Barthel index quotient in relation to the number of the months that each patient was followed up. For these calculations, ANOVA and the "Mood Median" Test were used. Statistical significance was defined as $p<0.05$.

RESULTS

The distribution according to gender is shown in Table 1. Of the sample population who had suffered from stroke, 51 men and 21 women were submitted to kinesitherapy, 19 men and 13 women underwent hydrotherapy followed by kinesitherapy, and 8 men and 6 women comprised the control group without any physiotherapeutic intervention.

Table 1. Gender comparing the three groups (N = 118).

Gender	Control	Kinesio-therapy	Hydrotherapy
Male	8	51	19
Female	6	21	13
Total	14	72	32

p = 0.3

Table 2 shows the distribution of age among the three groups. The mean age for the 14 individuals in the control group was 69.1 years and the median was 68.5 years (range: 44-88). For the 72 individuals in the kinesitherapy group, the mean was 62.4 years and the median was 64.5 years (range: 30-89) and for the kinesitherapy with hydrotherapy group, the mean age was 55.8 years with a median of 56.5 years (range: 28-74) (p = 0.01).

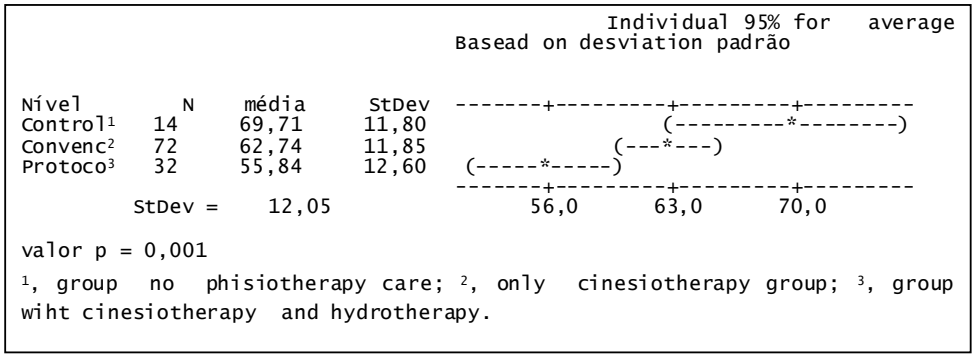
Table 2. Distribution of age comparing the three groups (years).

Group	N	Mean	Median	Range
Control	14	69.1	68.5	44 – 88
Kinesitherapy	72	62.4	64.5	30 – 89
Hydrotherapy*	32	55.8	56.5	28 – 74
Total	118	61.7	63	28 – 89

p = 0.01;* Two patients were young (28 and 32 years).

Analysis of Variance shows that there is evidence of a significant difference of the mean ages between groups (Figure 1). The difference in the mean age of 55 years in the kinesitherapy with hydrotherapy group is statistically lower than the two other groups, due to the presence of two young individuals who suffered strokes, one at the age of 28 years old and the other at 33 years old.

Figure 1. Distribution of mean ages according to the groups with no physiotherapy care, submitted only to kinesiotherapy and submitted to kinesiotherapy and hydrotherapy.



The difference between the first Barthel score and the second divided by the number of months under treatment, according to "Mood Median" Test, shows that there is evidence that the median of the "improvement / month" index was higher in the group submitted to hydrotherapy with kinesiotherapy than the other two groups (Figure 2).

DISCUSSION

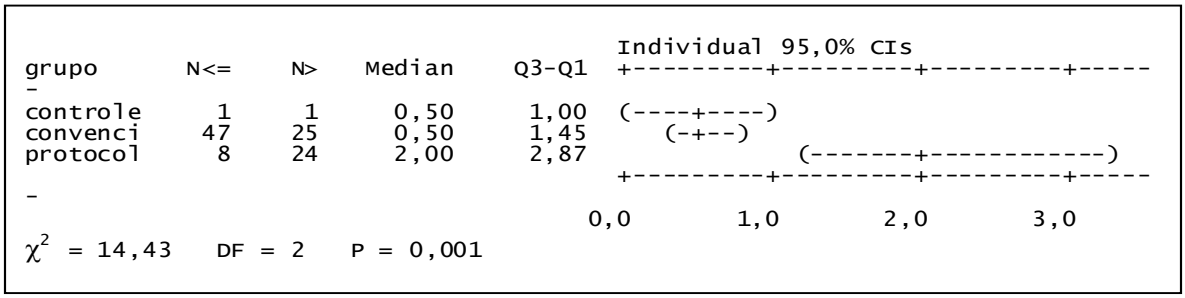
The number of women in the study sample is lower than the number of men, similar to other publications[2]. This fact is probably because the prevalence of strokes is greater in men and as a consequence there is a greater need for physiotherapy in men.

On the other hand, gender was equally distributed among the three groups and thus there was no bias.

A different distribution of ages among the three groups was surprising. This can be explained by the presence of two patients with ages well below the general average in the group submitted to kinesiotherapy and hydrotherapy. One of them had a stroke due to carotid artery trauma and the other, as a consequence of heart surgery[8,9].

The association of warm water and therapeutic exercises provides significant physiological effects; even for patients suffering lesions for longer periods of time, when treated with hydrotherapy associated to kinesiotherapy, there is a reduction in the muscle tonus, improvement in the movements and consequently an increase in the patients' degree of independence[21,22].

Figure 2. Relationship of the "improvement indexes" of the three groups of patients



An important advantage when performing therapeutic activities in warm water is that the physiotherapist can move patients with significant functional deficits easier than out of the water. The freedom of the movements provides greater amplitudes and the possibility of working the mechanical action of muscles[14]. Moreover, this favors the development of essential work on mass movement patterns and a kinesiologic basis of proprioceptive neuromuscular facilitation, the technique used with the patients in this study[20-22].

The resistance of the water to movement acts as an important proprioceptive stimulus. This is a factor linked to the therapeutic proposal; it makes an improvement in muscle strength possible and consequently improves the functional capacity[18].

Hence, the results showed the effectiveness of physiotherapeutic treatment when associated with hydrotherapic procedures; a technique that could be used to benefit other patients.

Moreover, the study showed that the program of exercises in the water improved the motor functioning, when kinesiotherapy was compared separately. The effects of the therapeutic swimming pool proved that water could ease the movements and provide an overall improvement. This may be considered a good coadjuvant procedure for patients with sequels due to strokes. As few papers have been published comparing classic physiotherapy with the combined effects of hydrotherapy followed by classic physical therapy, further studies with a larger study sample are required to confirm this conclusion.

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