Aquatic physical therapy as a treatment modality in healthcare for non-institutionalized elderly persons: a systematic review

Fisioterapia aquática como modalidade de tratamento em idosos não institucionalizados: uma revisão sistemática

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ABSTRACT

Objective: To review scientific literature pertaining to aquatic physical therapy in the elderly and institutionalized population. Methods: A qualitative systematic review of electronic databases MEDLINE and LILACS, with the topic index terms: "hydrotherapy", "homes for the aged or residential facilities", and "aged". In light of the lack of studies carried out on the institutionalized population, we opted for reviewing literature on the effectiveness of this modality of physical therapy treatment on the non-institutionalized elderly population in order to produce knowledge that can be critically analyzed according to its potential applicability for the institutionalized population. The methodological quality of the studies was assessed using the Delphi listing. Results: Of the 27 studies analyzed by their abstracts, 10 studies were excluded since they did not correspond to the eligibility criteria. We analyzed the subject characteristics of each study, as well as the quality of the methods (good methodological quality in 47% of the studies), the result measurements considered, the intervention strategies, the sites where they took place, and the professionals involved (76% by physical therapists). Conclusion: Although a large part of the studies demonstrated good results with aquatic physical therapy practice, none of them had been applied on long-stay institution for the elderly. Therefore, more studies are needed in this area for a model of assistance to long-stay institution for the elderly to be proposed. Keywords: Hydrotherapy; Homes for the aged; Treatment outcome

RESUMO

Objetivo: Revisar a literatura científica acerca da efetividade da fisioterapia aquática na população idosa e institucionalizada. Métodos: Revisão sistemática qualitativa nas bases de dados eletrônicas MEDLINE e LILACS, com os descritores de assunto: “hidroterapia” ("hydrotherapy"), “instituição de longa permanência para idoso” ("homes for the aged, residential facilities") e “idoso” ("aged"). Diante da inexistência de estudos realizados na população institucionalizada, optou-se por revisar a literatura acerca da efetividade dessa modalidade de tratamento fisioterapêutico na população idosa não institucionalizada, a fim de se produzirem conhecimentos que pudessem ser analisados criticamente conforme sua aplicabilidade potencial na população institucionalizada. A qualidade metodológica dos estudos foi avaliada por meio da lista Delphi. Resultados: Foram excluídos 10 estudos dos 27 analisados a partir do resumo, por não corresponderem aos critérios de elegibilidade. Foram analisadas as características dos sujeitos de cada estudo, bem como a qualidade metodológica (boa qualidade metodológica em 47% dos estudos), as medidas de resultado consideradas, as estratégias de intervenção, os locais onde ocorreram e os profissionais envolvidos (76% por fisioterapeutas). Conclusão: Embora, grande parte dos estudos tenha demonstrado bons resultados com a prática da fisioterapia aquática, nenhum deles foi aplicado em instituição de longa permanência para idoso. Sendo assim, são necessários mais estudos nessa área para que seja proposto um modelo assistencial em instituição de longa permanência para idoso. Descritores: Hidroterapia; Instituição de longa permanência para idosos; Resultado de tratamento

INTRODUCTION

With the progressive demand on the part of a population in constant growth – the population of elderly people – an increase is expected in the offer of beds in hospitals and long-stay institutions for the elderly (LSIEs) over the next few years¹.

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These LSIEs may be governmental or non-governmental, with a residential atmosphere, destined to be the collective residence for persons aged 60 years or more, with or without family support, under conditions of freedom, dignity, and citizenship. The elderly citizens who live in these institutions or at geriatric homes and clinics have unique characteristics, such as mean age of about 80 years, sedentarism, low autonomy, and absence of family members. These factors contribute towards the increase in prevalence of morbidities and comorbidities related to autonomy.

One of the most important complications in this age group is the occurrence of falls, a public health problem due to its frequency, associated morbidities, and high social and economic costs, especially when it causes increased dependency and the beginning of life in an institution.

Physical activity for the elderly person is able to provide beneficial organic effects, including general well-being, preservation of independence, prevention of diseases, control of special situations (stress and obesity, for example), and a decrease in chronic pain.

Aquatic physical therapy programs have frequently been indicated for the elderly population since they are carried out in a safe environment, with less susceptibility to falls, and with good acceptance of and compliance with treatment. This resource is applied in a thermal-heated pool by means of techniques developed especially with objectives of preventing diseases, promoting and maintaining, treating, curing and rehabilitating health.

The present study aimed to search scientific literature regarding effectiveness of aquatic physical therapy in the elderly and institutionalized population.

METHODS

Type of study

Systematic narrative review was carried out.

Data collection procedures

Bibliographic search was carried out using LILACS and MEDLINE databases in reference to publications of clinical trials in the last 10 years. The following index terms were used: “hydrotherapy”, “homes for the aged”, “residential facilities”, and “aged”.

No studies were found on hydrotherapy in this specific population. In light of this fact, we decided to review the literature on effectiveness of this modality of physical therapy treatment in the non-institutionalized aged population in order to produce knowledge that may be critically analyzed concerning its potential applicability in the institutionalized population.

The intersection of sets was used (index terms, type of publication, and 10-year period). The terms used for this new search were “hydrotherapy” and “aged.”

Twenty-seven articles resulted from the search with the mentioned criteria. All of them underwent analysis of the abstract by a single evaluator, and only those with the following inclusion criteria were selected:

- clinical controlled/randomized trials;
- treatment with any type of intervention protocol, as long as with complete immersion in a therapeutic pool.

The articles meeting these criteria had their entire content reviewed and underwent critical analysis, being confronted with other publications on the topic.

For evaluation of the methodological quality, Delphi’s Listing, comprising eight items, was used. The answers are presented in the form of “yes/no/I don’t know”, in which one of the alternatives must be chosen for each item; the greater the quantity of affirmative answers, the better the quality of the study.

RESULTS AND DISCUSSION

Ten of the 27 studies analyzed by their abstracts were excluded since they did not present the desired association between aquatic physical therapy and the elderly. These studies addressed local application techniques (without immersion in the pool) and they were not experimental, besides using a population under 60 years of age.
Sarmento GS, Pegoraro ASN, Cordeiro RC

Electronic databases Medline and Lilacs

Subject descriptors: Hydrotherapy + Aged

Medline = 481
Lilacs = 77

ULACS
Hydrotherapy + aged = 77
Limits: language Portuguese + Spanish + English = 8

27 studies

10 excluded: they were not intervention studies, had no complete immersion, age under 60 years

FINAL = 17 studies

Figure 2. Flowchart of the second review.

The remaining 17 articles were comprehensively analyzed. The classifications and characteristics of these articles are included in this review and presented in chart 1.

All studies presented specified eligibility criteria, intention to treat, and most reported primary outcome measurements, thus providing better quality studies.

With this discussion, we intended to describe the findings of the articles searched and to associate them to the dynamics of institutionalized aged persons.

Subject characteristics
As to subject characteristics of the articles analyzed, 29% of the articles had as inclusion criterion patients diagnosed with osteoarthritis of the hip and/or knee (13,14,17,23-24). As to gender, 23% of the studies involved aged women (10,12,18,21), and the mean age of all study subjects was 68 years. However, it is important to point out that the study conducted by Silva et al. (23) was the only one that had sample with a mean age of 59 years.

Regarding exclusion criteria, 41% of the articles excluded those individuals who had pathologies that limited exercise (4,10,11,13,17,23,25), those dependent on help for daily activities, and those who engaged in other exercises besides what was proposed in the given study.

As to the sample, 23% had fewer than 25 participants (4,10,19,21).

Methodological quality
Of the 17 studies, 47% were randomized and with a control group, i.e., with good methodological quality (11-14,17,22,24,25).

On the other hand, 29% were merely intervention studies, with no randomization or control groups (4,10,18,19,21), while 23% of the studies were controlled trials with randomization, but with no control group (15,16,20,23).

In 47% of the studies, the outcome evaluators were blinded (4,13-17,20,23). This methodological decision is very important, because when this is not the case, the results may be biased.

Applegate and Curb (8) stated that many studies do not allow a true double-blind characteristic, but even so, it is possible to carry out successful randomized trials without complete blinding if the outcome evaluators are blind to the proposed treatment.

Result measurements
As to measurements of results, 35% of the articles (13-16,20,23) applied the Western Ontario McMaster Universities (WOMAC) quality of life questionnaire specific for osteoarthritis, which is capable of assessing intensity of pain, joint stiffness, and functional difficulties resulting from hip or knee osteoarthritis (9).

In 23% of the studies (11,12,14,25), the questionnaire used to evaluate quality of life was the Short Form Health Survey (SF-36).

Another prevalent fact was pain assessment, also performed in 23% of the studies by means of the Visual Analog Scale (VAS) (16,17,23-24).

Blood pressure (BP) was mentioned as an outcome measurement by Candeloro and Caromano et al. (10) along with heart rate. On the other hand, for Gimenes et al. (4), only BP was used as a result.

In order to avoid biases, it is important to identify all resulting variables and to report hypotheses before beginning the study. Nevertheless, investigators conduct trials with aged individuals, many times confronted with the problem of various results. For example, quality of life or physical function may have more important
Frequency of Floor=40 and Balance, fear of falling

Mean age 65.6

Sessions, 45 minutes, during 6 weeks

Subject number 16

Significance

Exclusion criteria

Patients with stable congestive heart failure (CHF), functional class IV, injection fraction of 40%, or 60 years, stable frailty in the previous 3 months

Diabetes, peripheral arterial disease, chronic pulmonary disease, after stroke or other diseases that limit exercise

Minimizes exercises: 60-70% of maximum HR, resistance exercises and MS

Tolerance to exercise, muscular function, QOL — quality of life

Physical training in water was well tolerated and it seems to improve exercise capacity as well as MS in CHF patients

Balance, fear of falling down and QOL

Water exercise provided improved equilibration in diabetes and QOL, but not in fear of falling down

12 and 24 weeks

Pain, physical function, general health status (MSMQAS) The HT and Tai Chi group showed clinical benefits for over 12 weeks

6 and 6 weeks

Pain and self-reported global evaluation (MSMQAS) The functional gains were obtained in both exercise programs as compared to the control group

No significant changes in effect after intervention. However exercises in swimming pool seemed to have a more beneficial effect on pain immediately after treatment

6 and 6 months in the postoperative period of total knee arthroplasty

No

Increased HR=r heart rate

Well tolerated and it seems to improve exercise capacity

Physical training in water was well tolerated and it seems to improve exercise capacity as well as MS in CHF patients

No

The functional gains were obtained in both exercise programs as compared to the control group

No

The mean SBP after protocol in the first and last day showed statistically significant decrease

Both floor and water exercises had evinced clinical benefits in nearly all measures of result up to 6 months in the postoperative period of total knee arthroplasty

Significant improvement in abdominal muscle strength and resistance and in cardiorespiratory capacity

No

No

Statistic and dynamic balance

No

Static and dynamic balance

No

Static and dynamic balance

Significant improvement in balance, gait and Timed Test evaluation

After 14 days, abducting strength of the hip was significantly greater after HT as compared to hospital physical therapy and water exercises

Strength, gait speed and functional ability (MSMQAS)

Effects after intervention. However exercises in swimming pool seemed to have a more beneficial effect on pain immediately after treatment

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results than mortality, despite the latter being easier to measure\(^6\).

Since intervention in these studies had a curative character, large groups of diagnoses related to specific functional losses were selected. In institutionalized elderly persons, studies such as these, with intention to treat, could use more generic outcome measurements such as functional capacity and quality of life, since this population has a higher degree of functional fragility.

### Intervention strategies

In general, the protocol of exercises performed in the therapeutic pool obeyed the following sequence: warm-up, strengthening of lower limbs, flexibility, resistance, and stretching, all with increasing degrees of difficulty and in groups.

In addition to these, Devereux et al.\(^{12}\) also proposed water exercises based on Tai Chi and demonstrated that exercises in the water produced significant changes in balance and quality of life, but not in the fear of falling.

Fransen et al.\(^{13}\) compared groups in hydrotherapy, Tai Chi exercises, and a control group and verified clinical benefits in both intervention groups.

In 23% of the articles, exactly the same intervention group was used\(^{14,17,22,25}\), which consisted of hydrotherapy, floor exercises, and a control group.

Stener-Victorin et al.\(^{24}\) compared hydrotherapy, electroacupuncture, combined with educational talks and a group that received only the educational talk. The authors were able to affirm that the two intervention groups produced lasting effects, and demonstrated reduced movement pain and quality of life. Only this latter study used combined therapy. In cases in which the objective was the recovery of functionality, elderly patients were benefited by combined therapy, e.g., by hydrotherapy and floor exercises.

The duration of intervention varied from only 10 sessions, in Medeiros et al.\(^{\text{19}}\), to a 6-month follow-up, in Rahmann et al.\(^{\text{20}}\). Almost all studies applied their protocols with a frequency of 2 to 3 times a week, with 30 minutes to 1 hour duration of each session.

Of the 17 studies, 41% of them showed follow-up even after the end of the intervention\(^{13,15-17,20,23,24}\).

### Intervention sites and professionals involved in application of the method

Of all articles reviewed, none of them had an LSIE as the site of the intervention. Of these, 52% were conducted in teaching clinics of universities\(^{4,10,15,16,19,21-24}\), while 23% were held in therapeutic pools within hospitals\(^{13,14,20,25}\). Only 11% made no mention as to where they were carried out\(^{11,17}\). There was also a study conducted in a community aquatic center and gym\(^{12,18}\).

The vast majority (76%) was applied by physical therapists\(^{4,12-17,19,20,22-25}\); only two were performed by physical education professionals\(^{18,21}\). In two articles, the professional involved was not mentioned\(^{4,11}\).
Lund et al.\(^{(17)}\) reported in their study that the professionals involved were, in reality, senior year Physical Therapy students, while Rahmann et al.\(^{(20)}\) mentioned that the professional in their study had 5 years of experience in orthopedic postoperative care. Only 17% of the articles declared the experience of their professionals\(^{(14,20,24)}\).

**CONCLUSION**

Even though a large part of the studies demonstrated results with the practice of aquatic physical therapy, none of them was applied in an LSIE environment. Based on these studies in community elderly persons, a model of aquatic physical therapy assistance can be proposed, with well-defined inclusion and exclusion criteria. Thus, further studies are needed in this area to propose a model of assistance in LSIEs.

**REFERENCES**