EFFECTS OF AN AQUATIC VERSUS NON-AQUATIC RESPIRATORY EXERCISE PROGRAM ON THE QUALITY OF LIFE IN HEALTHY AGED PERSONS

Maiza Ritomy Ide [1]
Fátima Aparecida Caromano [2]
Clarice Tanaka [2]
Antonio Luiz Rodrigues Júnior [3]
Juliana Montijo [4]
Luana Muriel Casarolli [4]

[1]*Msc - Division of Physical Therapy, University of the West of Paraná, Brazil*

[2]*PHD - Division of Physical Therapy, School of Medicine, University of Sao Paulo, Brazil*

[3]*PHD (Public Health Doctor), School of Medicine of Ribeirao Preto, Brazil*

[4]*Students at University of the West of Paraná, Brazil*

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ABSTRACT

Background: Aging process is growing in the world. Exercise improves well-being and auto-esteem of aged people by many factors, leading to QOL (quality of life) improve. This study intended to assess the effects of a respiratory exercise program developed in two ways - aquatic and non-aquatic - in the QOL of aged persons. Methods: fifty-nine volunteers between 60 and 65 years were randomized into 3 groups. G1 underwent a program of aquatic respiratory exercises. G2 participated in the same program, but out of the water. G3 did not undergo an exercise program, acting as the control. All volunteers answered SF-36 generic questionnaire to measure QOL. At the end of the program, subjects were assessed once again, with the same questionnaire. Individual results were compared to each subject before and after the program. Average group results were compared between the groups. Results: There were no

significant differences among experimental groups. However, physical and emotional aspect responses showed p-values close to the critical point (p= .059 and .054, respectively). Conclusions: Aquatic respiratory exercises seem to improve functional and emotional aspect of aged subjects. However, it does not seen to affect the other SF-36 aspects. Studies with higher intervention time are recommended to get definitive conclusions about it.

KEY WORDS: quality of life; aged; hydrotherapy; exercise

INTRODUCTION

Carvalho (2002) and Timo-Iaria (1996) analyzed aging as a dynamic and gradual process, with morphologic, functional and biochemicals changes. These changes modify the body, making it susceptible to intrinsic and extrinsic aggressions, leading to death. Aging process begins in the end of the second life decade and is little perceivable for long time. In the end of the third decade, the first functional and/or structural aging alterations appear (PAPALÉO-NETTO and PONTE, 2002).

In developed countries, United Nations considers aged the subjects older than 65 years. In developing countries, the limit age is 60 years (PASCHOAL, 2002). According to Berquó (1996), there are more than 7 million people older than 65 years old in Brazil. It is estimated that such population will be around 32 million in 2025 (KALACHE et al., 1987), when it will be 1-2 billion people older than 60 years in the world (OMS, 2001). Aging occur due to age mortality decline, which contributes to life expectancy increase (PIERCE, 1996). The third age increase is a problem that needs studies and planning of health and public politics, because of the inevitable growth of demand in health systems (VERAS et al, 1987).

Inadequate or late interventions can lead to loss in the physical function and quality of life (QOL) in aged people (YUASO and SGUIZZATTO, 2002). QOL maintenance is tied with autonomy and independence, which are good health indicators (PAPALÉO-NETTO and PONTE, 2002). The QOL depends on the life circumstances of a subject, group or population. Its concept is complex, enclosing social and physical characteristics (BIRREN and DIECKMAN, 1991). In aged people, its measure is useful to

assess intervention effectiveness or when it is necessary to detail clinic characteristics with more information to support clinical decisions about social resources. Assessing quantitatively QOL also makes possible to compare nations and estimate needs and yearnings of a population (REBELATTO and MORELLI, 2004).

In health area, a lot of distinct instruments are used to quantify QOL. Shorts Form Health Survey (SF-36) is one of the most common one. This generic questionnaire has 8 components: functional capacity, physical aspect, pain, general health status, vitality, social aspect, emotional aspect and mental health. Each component generates a score from zero to 100 (zero is the worst and 100 is the best health status).

Respiratory exercises involve corporal movements, particularly trunk and upper limbs ones, combined with specific ventilatory patterns. When they are developed in aquatic way, the respiratory system suffers constant water overload, improving exercise load (CURETON, 2000; BECKER, 2000; CAMPION, 2001). Aquatic respiratory exercise still leads to general exercises benefits. Regular exercise can lead to normal arterial pressure, sugar and lipid profile, osteoarthritis and neurocognitive function (NIED and FRANKLIN, 2002). It also improves bone density, muscular mass, arterial complacence and energy metabolism (MAZZEO and TANAKA, 2001), besides attenuating depression and anxiety that follow sedentary habits and senescence (NEGRÃO et al., 1991).

Exercise improves well-being and auto-esteem by many factors. Social and emotional contact leads to psychosocial benefit (O'BRIEN and VERTINSKY, 1991; TRAVIS, DUNCAN, & McAULEY, 1996; ELLINGSON and CONN 2000). Regular exercises are also associated with decrease of age related mortality (NIED and FRANKLIN, 2002). These benefits can improve QOL of aged people (MAZZEO and TANAKA, 2001), although this population needs special care (MAROLF et al., 2001). Due to high chronic illness incidence and low functional capacity, aged people are very benefited with the exercise practice (EVANS, 1999).

The emphasis of any aged people exercise program must be in QOL (Pollock et al 1994). Exercise can keep auto-esteem in those who have changes in their physical abilities, as well as in general aged people, affecting directly the QOL (ZIMMER, HICKEY, and SEARLE, 1995).

Exercise benefits are bigger in the aquatic way, a pleasant, motivator and stimulant place. Because of there characteristics, hydrotherapy has a high adhesion and acceptance level, besides a significant psychosomatic improve. A psychological improvement

is easily observed, probably due to physical relaxation, pleasure, integration and socialization provided by aquatic activities (BARRY and EATHORNE, 1994).

This study intended to assess the effects of a respiratory exercise program developed in two ways - aquatic and non-aquatic - in the QOL of aged persons.

METHODS

Study design

This is a prospective, randomized, controlled trial that analyzes the efficacy of aquatic and non-aquatic therapy in treatment of aged persons.

Variables studied

- Dependent: scores of the questionnaire SF-36
- Independent: aquatic or non-aquatic exercises
- Sample and randomization

Eighty-one volunteers between 60 and 65 years were initially selected and 59 completed the study (average age: 62.15 yrs). Calculation of the required sample size contemplated a 90% statistic power to detect a 40% difference in the intervention group. A 5% significance level and 95% confidence interval was established. Pocock equation was used for the sample calculation (POCOCK, 1983).

Subjects were admitted into the sample as they had been recruited for the initial screening. As inclusion criteria, volunteers should be socially active but they should not have any physical activities more than once a week; they should be non-smokers for last 10 years; they must be free of respiratory, muscular, cardiac, or neurologic disabilities nor chronic diseases which could affect their performances. Among them, those who showed water phobia or skin diseases were excluded from the sample, as well as those who showed time availability, access to transport, acceptance of the routine of training (foreseeing a maximum of 20% absenteeism), intention to complete the training, and the signing of the informed consent form were also considered

Three experimental groups were built as subjects had been recruited in the time. One randomized sequence had been defined that allocated volunteers into experimental groups: (G1) underwent a program of aquatic respiratory exercises; (G2) participated in the same program, but out of the wate; (G3) did not undergo an exercise program, acting as the control. There were 22 drop-outs. At end of study, there were 19 volunteers into G1, 19 into G2, and 21 into G3.

Procedures

All volunteers answered SF-36 generic questionnaire to measure QOL. At the end of the program, subjects were assessed once again, with the same questionnaire. Individual results were compared to each subject before and after the program. Average group results were compared between the groups. Final assessment was applied with a minimum of 24-hour and maximal interval of 5 days after the end of the exercise program. At the end of the study, subjects were informed of their results.

The respiratory exercise programs were developed with identical objectives, but were adjusted to the aquatic or non-aquatic environments. They were applied for 10 consecutive weeks, 3 times per week, with sessions of 1 hour each. The activities are described in TABLE 1.

Table 1 - Program of respiratory exercise applied to water and land groups

Initial warm-up - walk in circles with sporadic changes of direction.
Active/resisted exercise of horizontal adduction-abduction of shoulder joint.
Active/resisted exercise of flexion-extension of the shoulder joint.
Active/resisted exercise of anterior flexion associated with trunk rotation.
Active/resisted exercise of trunk lateral flexion.
Active/resisted exercise of trunk lateral rotation.
Active exercise in closed kinetic chain for upper limbs.
Active exercise of raising the upper limbs above the head.
Final relaxation—deep inspiration and expiration, without the accompaniment of other movements.

Exercises were performed with gradual increases in intensity in accordance with the ability of each subject. They followed a logical sequence of warm-up, conditioning, strengthening and cool-down routines. Deep inspirations and expirations were requested during all the exercises. Both groups used resources for best exercise motivation, such as bars, bells, balls, arcs, and batons.

Participants in the G3 went to the place of the program once per week. Subjects performed activities different from exercises, such as attending lectures on general subjects and participating in enjoyable activities. This was intended to produce equivalent attitudes in the 2 interventions groups and in G3, since the active groups might have benefited from the change of scenery and by the social conviviality experienced during the exercise program. Such factors could have influenced and/or caused the effects produced by the exercises to be overestimated.

All the procedures were performed with the help of trained researchers of the physical therapy clinics and of the laboratories of the involved universities. For the aquatic program, a warm swimming pool at 32 ± 2ºC was used, with the dimensions of 11.8 x 7.75 m and 1.05 m of depth. The G3 used a room with dimensions of 7 x 11.5 m.

Table 2 – Average differences before-after in the 8 aspects of SF-36 questionnaire, in the groups

Group	Physical Aspect	Functional Capacity	Pain	General Health status	Vitality	Social Aspect	Emotional Aspect	Mental Health
Aquatic	-9,21	0,79	2,16	7,32	-3,95	10,53	-7,02	-4,42
Non-aquatic	5,26	4,74	11,05	3,11	6,58	16,05	5,26	4,42
Control	28,57	6,67	5,00	3,48	4,05	17,86	38,10	4,95

Statistical Analysis

The responses from 8 aspects of the SF-36 questionnaire were analyzed by Analysis of Variance (ANOVA) for completely randomized design, using the differences between measurements before and after treatment, considering QOL variables from each volunteer, as follow: physical aspect (PA), functional capacity (FC), pain (PAIN), general health status (GHS), vitality (VITA), social aspect (SA), emotional aspect (EA) and mental health (MH). The analysis compared 3 experimental groups (aquatic, non-aquatic and

control) as the factor in study. The level of significance of 5% was adopted by present study to perform the test of hypothesis. Scheffe test was used as ANOVA pos-test for PA and EA because their p-value from ANOVA had been close to critical point, considering volunteers drop-out affected the power of test.

RESULTS

The exploratory values for the QOL variables (PA, FC, PAIN, GHS, VITA, SA, EA e MH) are presented in Table 2. ANOVA's results were not significant for every response variables: PA, p-value=.0593; FC, p-value=.5906; PAIN, p-value=.5254; GHS, p-value=.8352; VITA, p-value=.1175; SA, p-value=.9240; EA, p-value=.0542; and MH, p-value=.1834. For every ANOVA's results, Bartlet test was not significant, which means there was homogeneity of variances among observed data. There were no significant differences among experimental groups, at 5% level of significance. However, PA e EA responses showed p-values close to the critical point (p-value=0.059 and p-value=0.054, respectively, which might induce an uncertainty to decisions about null hypothesis. It is quite reasonable to reject null hypothesis in the ANOVA and pairwise comparisons by Scheffè test: there was significant difference between G3 and G1, at p-value=0.063 for PA and at p-value=0.067 for EA.

DISCUSSION

There was no statistic difference between the groups. A trend to improvement in the aquatic respiratory exercises group (G1) in 2 domains (functional and emotional aspects) was found.

It was not found randomized trials comparing aquatic and non-aquatic exercises in healthy elderly persons.

The isolated use of water-based exercises in healthy elderly persons is rare. Most of the researches study specific diseases in the older persons, as osteoarthritis (COCHRANE et al., 2005), chronic heart failure (CIDER et al., 2003) and chronic kidney disease (PECHER et al., 2003), for example. These kind of studies are obviously very different from our study. It was found one lonely research about the

effects of water-based effects in healthy elderly persons. Devereux et al. (2005) submitted 50 women to receive or not a 10-week water-based exercise and self-management program. Authors found significant differences in 4 of 8 domains of QOL measured using the SF-36 (physical function, vitality, social function and mental health. These differences were not found in our research and were expected, considering that the aquatic way is a differentiated and appropriate way to develop activities with aged persons. It allows training in groups, improving recreation and socialization (CAROMANO and CANDELORO, 2001). The aquatic exercised group improvement was also expected due to the known aquatic therapy benefits, explained by the physical water effects in the immersed body, which results in physiological and therapeutic properties (BATES and HANSON, 1998).

Our study did not found improvement in the QOL in the non-aquatic exercises group. However, non-aquatic exercises effects in the QOL of healthy elderly persons are better established in the literature than the aquatic exercises. Ellingson and Conn (2000) reviewed 11 experimental studies on the effects of non-aquatic exercises in the QOL of aged subjects. Seven of then found improvement in any component of the QOL. Two experimental studies about non-aquatic exercise and QOL in healthy aged persons were found. Blumenthal et al. (1994) randomized 101 aged subjects (mean age: 65yrs) to a 4-months program of aerobic exercises or yoga or flexibility exercises or control. Aerobic exercises showed improvement in psychological and behavior variables. However, Chin et al. (2004) agree with our research and did not found any improvement in the QOL after a 6-month exercises program. Subjects (n=173, aged between 64 and 94 years) were randomized into one of 3 exercises groups: endurance training, functional training and both.

An improvement in the QOL of the subjects in both groups (at least at the aquatic group) was expected. However, it was detect only a trend to improvement in the aquatic group. Authors believe that, if interventions were applied during some more weeks, a significant improvement in QOL of the subjects would be found. Ellingson and Conn (2000) reported that QOL studies need to be done for long time, since that QOL changes requires a lot of time to be detected and subjective components are difficult to measure. Ellingson and Conn (2000) recommend clinical trials with at least 1-year of intervention to improve QOL.

CONCLUSIONS

A 10-weeks respiratory exercises program do not improve QOL of healthy elderly persons, independently of the way of accomplish. Long-term studies are recommended to get definitive conclusions.

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