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The effect of aquatic-resistance training on quality of life in postmenopausal women

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Abstract

The study investigated the impact of aquatic-resistance training on quality of life in postmenopausal women. Twenty four postmenopausal women were categorized into control and training groups. The aquatic-resistance training was administered for a period of 8 weeks, 3 days a week; a session each day. Quality of life was assessed by a quality of life questionnaire (MENQOL). The results of T-score showed there were significant improvements in psychosocial symptoms and physical function in training group and no significant changes in vasomotor and Sexual Symptoms. The results revealed aquatic-resistance training produced positive impacts on the quality of life in postmenopausal women.

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1. Introduction

Today, most women live long enough to become menopausal (Nedstrand 2005). Menopause is not a disease, but rather a normal physiologic event in a woman’s life (Nanette 2002).

It is an adaptation process during which women go through a new biological state. This process is accompanied by many biological and psychosocial Symptoms changes (Nedstrand 2005). It can be associated, however, with health complaints and a decrease in quality of life (Littrell 2009, Nedstrand 2005). The interest of clinical research in aging women and males increased in recent years and thereby the interest to measure health-related quality of life and symptoms. Women, as do men, experience an

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age-related decline of physical and mental capacity. They observe symptoms such as periodic sweating or hot flushes, impaired memory, lack of concentration, nervousness, depression, insomnia, and bone – joint complaints (Heinemann2004).

Menopause is associated with a natural decline in estrogen that increases visceral fat mass, decreases bone mass density, muscle mass, and strength (Agil 2010) also, muscle mass in women tend to decrease gradually after the 3rd decade of age, and shows an accelerated decline after the 5th decade (Agil 2010). Decline in muscle mass called sarcopenia is related to limited functional performance and physical disability and women are more susceptible to present these health problems, as compared to men, because they live longer (Agil 2010). This loss of muscle mass and often corresponding increase in body fat, affects strength, metabolism, and functional capacity, all of which have a role in health and quality of life (Colado 2009).

The close association between lifestyle and health is generally recognized. Much is still to be learned about the reciprocal influences of lifestyle, decision to use Hormone Replacement Therapy (HRT), and quality of life (Nanette 2002). Concepts of quality of life vary from measures of subjective well-being, symptoms, or other indicators of health status to that of functional status (Nanette 2002). Quality of life is a multidimensional health concept, which represents mainly subjective symptoms that may influence the sense of well-being and day-to-day function. It includes several important domains, such as perceived well-being, role disability, and physical, psychological and social function. Women may experience significant Quality of life changes during menopause, and only a few researchers have quantified these changes (Fuh 2003). The most relevant factors influencing a woman’s quality of life during the menopause transition appear to be her previous emotional and physical health, her social situation, her experience of stressful life events (particularly bereavements and separations), as well as her beliefs about menopause and aging (Nanette 2002).

Due to the complexity of menopausal symptoms, many different alternatives to hormone replacement therapy have been developed to control menopausal symptoms. They include the use of herbal drugs, diet/nourishment, exercise programs, and lifestyle modification programs (Nedstrand 2005). It is evident that exercise is becoming one of the most important alternative treatment procedures (Dallec 2009) and there is good evidence that regular physical activity reduces the risk for cardiovascular diseases (Barbagallo 2001). Also, Physical exercise prevents bone loss in postmenopausal women (Zaro 2009).

Physical activity, especially resistance training, is a major determinant for maintaining muscle mass and reducing the accumulation of intramuscular fat mass (Agil 2010). Selection of the appropriate physical activity is essential in order to avoid injuries and ensure exercise adherence (Sakai 2010). Postmenopausal women are challenged to find exercise activities that are safe, rewarding, and beneficial to overall health. These women are drawn to water exercise programs for many psychological and physical reasons, including the supportive environment that provides freedom of movement, which may have been lost on land (Littrell 2004). Recently, aquatic exercise has been proposed as an alternative mode of exercise for improving overall fitness, especially in individuals with low levels of physical fitness (Sakai 2010). Rationale for using aquatic balance training is seen in the various properties of water, the most important of which include buoyancy, hydrostatic pressure, and viscosity (Piotrowska 2007). The resistance of the water promotes strengthening. So water acts as a variable ‘accommodating’ resistance (Raffaelli 2010).

It has been hypothesized that viscosity and buoyancy may improve balance by stimulation of muscle proprioception and deep muscles in water (Hu 2004). Although water reduces the effects of weight bearing on skeletal joints at rest, thus imposing little strain on low-joint extremities, the resistive effect of water provides exercise loading during limb movements, which enhances muscular tension and increases energy expenditure beyond that achieved with land exercise (Sakai 2010).
While it is accepted that resistance training programs can improve muscle mass, strength, power, and local muscular endurance, less is known about the effects of different modes of resistance training, such as aquatic resistance on these parameters or other indicators of health (Colado 2009). In light of the limited information on resistance aquatic exercise training and its effect on quality of life in postmenopausal women, the main purpose of this study was to determine the effects of 8 weeks aquatic resistance training on quality of life in postmenopausal women.

2. Methods

1.1. Subjects

Twenty-nine healthy postmenopausal women individuals who did not exercise regularly were recruited in this protocol. They were all between 50-60 years of age. They were not taking medication or hormone therapy that they were all functionally independent and had no neurological, cardiovascular, metabolic, inflammatory, or musculoskeletal conditions that advised against their participation in a physical exercise program. None had ever participated in resistance training exercises nor were involved in aerobic exercise. Each participant was randomly placed into two groups: Aquatic resistance training who exercised in water with using the resistance equipment, and control. In anticipation of potential drop-outs that often occur during the administration of unpaid research studies, twice as many women were placed into exercise group. Therefore, 14 women were in the exercise group (and 10 were in the control group). Five subjects were excluded due to trouble in home (n = 3), surgery (n = 1) and infectious disease (n = 1). All the women had a natural menopause, with amenorrhea at least 1 year prior starting study (average time of amenorrhea 5.2 ± 0.8 year). All subjects were instructed not to modify their behaviour or diet, nor to do any other type of physical exercise for the duration of the study. Subject's characteristics are presented in Table1.

Table 1. An example of a table

| Group          | Aquatic (n=14) | Control (n=10) |
|----------------|---------------|---------------|
| Age (year)     | 55.2±3.7      | 54.4±4.6      |
| Height (cm)    | 155.2±6.3     | 156.6±5.5     |
| Weight (kg)    | 68.6±10.2     | 68.5±10.2     |
| BMI (kg/m²)    | 28.5±3.4      | 27.9±3.9      |

1.2. Testing procedures

All subjects underwent anthropometric measurements (height, weight, BMI); Weight and height values were then used for the calculation of BMI. Quality of life before and after training period was performed by the MENQOL questionnaire. The questionnaire was contained 4 sections: Vasomotor Symptoms (questions 1 to 3), Psychosocial Symptoms (questions 4 to 10), Physical symptoms (questions 11 to 26) and Sexual Symptoms (questions 27 to 29). Scoring the questionnaire was a scale of values from zero to six. Zero indicated the absence of symptoms and the number six represented more severe symptoms. The
scores added together and according to the final score quality of life was calculated. Lower scores indicated higher levels of quality of life.

Subjects were tested at the same time of the day and tests were performed in the same order for pre- and post-testing.

1.3. Training protocol

The aquatic exercise was 60 min, three times per week for 8 weeks at deep parts of the pool in the Shohada swimming pool of the Borojen. The water temperature was 28–30°C. The training protocol consisted of 60 min with 15-min warm-up and flexibility exercises based on walking, 30-40-min resistance exercises and a 5-10-min cool-down. The first week was spent on training walking and running in water and the rest 7 weeks was spent on training with aqua dumbbells weighing 250 grams. Program sessions were generally as follows: the first session, participants carried weights with their hands but they performed all movements by hands and feet. At the second session they carried weights by feet and performed the exercise by hands and feet and at the third session they carried weights by both feet and hands and performed movements. The exercise programs of each session were different and were arranged according to principles of exercise science and the nature of water. All training sessions were led by an experienced mentor.

All statistical analyses were performed using SPSS for Windows version 16.0. All data were normally distributed, and presented as mean ± SD. The paired Student’s t test was used to compare each variable within-group and between-group before versus after training. Differences at P≤ 0.01 were considered significant for all statistical analyses.

3. Results

Fourteen postmenopausal women in aquatic resistance training group and ten postmenopausal women in the control group conducted the test procedures of this study.

The Vasomotor Symptoms decreased by 22.28% from 3.86±3.85 to 3.0±2.86 in exercise group, although, it was not a significant reduction compared with control group (P=0.41), there was no significant changes in Psychosocial Symptoms section in exercise group after 8 weeks aquatic training versus the control group (P=0.17). It was observed that the Physical Symptoms were significantly lesser during post-test than pre-test in the training group (reached from 32.43±13.99 to 14.43±10.39) by 55.10% decreasing (P=0.00) and a negligible increase by 5.66% (P=0.43) in the control group. Independent T-test showed a significant improvement for Physical symptoms in experimental group after 8-weeks compared with control group (P=0.005).

No significant changes were observed in sexual Symptoms in experimental and control groups (table2).

| Variable              | Aquatic Group (n=14) | Control Group | *P value | †P value |
|-----------------------|----------------------|---------------|----------|----------|
|                       | pre      | post    | P value | pre      | post    | P value | P value |
| Vasomotor Symptoms    | 3.8±3.8  | 3.0±2.8 | 0.32     | 5.1±3.9  | 5.4±2.7 | 0.72     | 0.41     |
|                     |       |       |       |       |       |       |
|---------------------|-------|-------|-------|-------|-------|-------|
| Psychological       | 11.7±6.2 | 7.4±6.2 | 0.01* | 14.8±6.9 | 14.0±9.2 | 0.62 | 0.17 |
| Physical Symptoms    | 32.4±13.9 | 14.4±10.3 | 0.00* | 31.0±20.1 | 32.8±22.5 | 0.43 | 0.005† |
| Sexual Symptoms      | 7.5±5.0 | 6.7±6.1 | 0.51 | 12.4±6.2 | 12.0±6.8 | 0.9 | 0.88 |

*p values assessed by dependent t-test  † P values assessed by independent t-test
4. Discussion

Physically active lifestyle can reduce the perceived intensity of menopausal symptoms and increase the state of being psychologically fine (Agil 2010). The aim of this research was to investigate the effect of aquatic resistance training on quality of life in postmenopausal women. In the studies, it was found that short-term resistance exercise training in postmenopausal women does not make a significant change on BMI and waist hip ratio (Elliot 2002). In terms of BMI, however, no significant change was observed in exercise group. It was considered that the duration of the exercise training being short in exercise group might be an important reason why no positive effects of the exercise on the body composition was observed. It is stated in various studies and compilations that physical activity and the participation in exercise have some significant positive effects on symptoms related to menopause (Agil 2010).

Based on this study, an 8-weeks aquatic resistance training exercise has an impressive effect on the physical symptoms in quality of life in postmenopausal women, but there were no significant changes in the other symptoms (fig1). It was considered that the duration of the training being short and low number of individuals might be a reason why no significant effects of the exercise on the psychosocial symptoms were observed. The results of the present research are in accordance with the findings of Agil et al (2010) in the case of sexual symptoms.

Udea (2004) obtained significant improvements in the quality of life after 12-week moderate aerobic exercise training. In the study of Agil et al. (2010), is stated that depression levels significantly decreased in resistance and aerobic exercise groups. Improvements were observed in all subscales of menopause-specific quality of life questionnaire in both resistance and aerobic groups except for sexual symptoms (Agil 2010). Also, 3-month and 6-month periods of exercise in Karakan’s (2010) study has shown significant reductions in somatic, psychological and urogenetic symptoms in menopausal women.

The result of our study supported the idea that regular exercise has positive effects on psychosocial symptoms as stated in literature. However, the results we obtained support the studies that show the positive effects of exercise on the quality of life (Ueda 2004).

![Quality of life subscales before and after aquatic training in exercise and control groups](image-url)
5. Conclusion

The present study suggests that an 8-week aquatic resistance training (supervised by a trainer) has an impressive effect on quality of life in postmenopausal women between 50-60 years old. Thus, training with aquatic resistance exercises is a viable alternative to traditional resistance trainings, and may provide more benefits to individuals who would be more sensitive to heavier loading or to impact, which may occur when training on dry land with certain devices and exercises. This mode of exercise can be particularly beneficial for individuals with orthopedic problems, overweight individuals and those who have not learned how to swim.

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