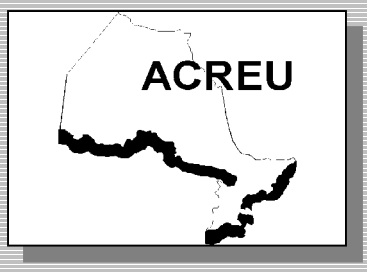

Arthritis Community Research & Evaluation Unit (ACREU)

The benefits of group recreational aquatic programs compared to land-based exercise programs for clients with self-reported arthritis: a pilot study

February, 2002

Prepared by:

Barbara Rimmer
Dawn Berry Merriam
Sydney Lineker
Renee Elsbett-Koeppen
Joanne Fortier-Hughes

*Address for correspondence:

Arthritis Community Research & Evaluation Unit
Toronto Western Hospital Research Institute
399 Bathurst Street
MP-10th Floor, Suite 316
Toronto, Ontario M5T 2S8
Tel: (416) 603-6269
Fax: (416) 603-6288
www.acreu.ca

Working Paper 2002-01

In partnership with The Arthritis Society, Ontario Division & in affiliation with The University of Toronto

University Health Network
Toronto General Hospital · Toronto Western Hospital · Princess Margaret Hospital

The Arthritis Society

University of Toronto

The benefits of group recreational aquatic programs compared to land-based exercise programs for clients with self-reported arthritis: a pilot study

February 2002

Prepared by

Barbara Rimmer
Dawn Berry Merriam
Sydney Lineker
Renee Elsbett-Koeppen
Joanne Fortier-Hughes

Arthritis Community Research & Evaluation Unit
Toronto Western Hospital Research Institute
399 Bathurst Street, MP10-316
Toronto, Ontario M5T 2S8
Telephone: (416) 603-6269
Fax: (416) 603-6288

Supported and/or funded by The Peterborough Foundation, Human Resources Development Canada, the Peterborough branch of the Victoria Order of Nurses (VON), The Peterborough YMCA, The Peterborough Good Life Fitness Centres, The Arthritis Community Research and Evaluation Unit (ACREU), The Arthritis Society, Ontario Division and the Peterborough branch of the Arthritis Society Aquatics Program (ASAP).

THE BENEFITS OF GROUP RECREATIONAL AQUATIC PROGRAMS COMPARED TO LAND-BASED EXERCISE PROGRAMS FOR CLIENTS WITH SELF-REPORTED ARTHRITIS: A PILOT STUDY

EXECUTIVE SUMMARY

Objective: To examine the differences in outcomes between individuals participating in recreational water-based and land-based exercise programs; and to describe the differences in characteristics of people who choose these programs.

Method: Adults with self-reported arthritis selected a standardized land or water based exercise program run by trained fitness instructors. Assessments were made by an independent assessor at baseline, 10 weeks and 3-month follow-up using reliable and validated outcome measures (SF-36, Lower Extremity Functional Scale (LEFS), verbal rating scales for pain and stiffness, the CES-D and the Timed Up and Go (TUG)). Paired t-tests or the Chi-square test were used to analyze the changes from baseline. Difference scores were calculated and compared at post intervention and 3-month follow-up to evaluate possible differences between groups.

Results: Seventy-nine adults were assessed at baseline (mean age: 59 years, 82% female). There were no differences between the groups at baseline, however, the water-based group tended to have worse general health, worse mental health and poorer lower extremity function. Twenty-three subjects in the land group and 36 in the water group completed at least 80% of the exercise sessions. Improvements were seen in TUG for both groups ($p<.003$). The land exercise group showed significant improvements in SF-36 physical functioning ($p=.001$), and the water exercise group showed significant improvements in SF-36 mental health and reported health transition ($p<.002$). Both groups demonstrated clinically important improvements in LEFS scores (mean change: ≥9). There were no significant differences in outcome measures between the groups at 10 weeks (n=59) or at 3-month follow-up (n=45) ($p>.003$). However, at follow-up, more people in the water group reported that their need for assistance from others decreased ($p=.001$). Combining the groups, there were improvements at 10 weeks in SF-36 (vitality, health transition, mental health) and the TUG ($p=.003$). These changes were maintained at 3-month follow-up. There were no increases in pain or number of painful joints.

Conclusions: There were few differences between the groups suggesting that either type of exercise can benefit people with arthritis without exacerbating their joint symptoms. The results suggest that water exercise may be a more appropriate choice for those with a greater severity of disease.

KEY WORDS: Arthritis; Exercise; Land; Pool; Hydrotherapy; Aquatics.

TABLE OF CONTENTS

LIST OF TABLES, APPENDICES

1.0 INTRODUCTION

Arthritis is one of the most prevalent chronic conditions in Canada. One in seven people in Canada will suffer from some form of arthritis. The number of people with arthritis will increase at a rate of one million more Canadians per decade at least until the year 2031. This increase is equivalent to 100,000 people per year, or 300 people per day. The most significant growth will occur in the baby boom generation. As a result, the demand for services in general is anticipated to grow relative to this demographic shift[1]. In 1996, Haliburton, Kawartha & Pine Ridge had a population of 300,008[2]. Since arthritis affects 1 in 7 Canadians, 42,858 people in this region potentially suffer from some form of arthritis.

A recent report from the Canadian Fitness and Lifestyle Research Institute and the College of Family Physicians of Canada states that "regular physical activity maintains functional ability with aging and reduces arthritis pain"[3]. Joint movement and loading as a result of physical activity promotes nutrition of cartilage and healthy bone formation[4]. Properly prescribed and supervised exercise is beneficial for reducing pain, functional disability and depression, and increasing activity levels for patients with arthritis without increasing joint symptoms[5-10].

Aquatic programs and land-based programs are frequently employed components of the management for people with arthritis[8-21] although formal evaluation studies are limited in scope. To date, studies suggest that there is no increased benefit from exercising in water over exercising on land for people with arthritis; but people with advanced disease and those pre and post surgery are often excluded from these studies[5, 10, 22-25]. The purpose of this study was to examine the differences in outcomes between individuals with self-reported arthritis participating in group recreational water-based and land-based exercises; and to describe the differences in characteristics of people who choose land and pool exercise programs. This study was approved by the University

Health Network Research Ethics Board of the University of Toronto, Toronto, Ontario, Canada.

2.0 METHODS

2.1 Sample

To encourage participation, a research awareness campaign was launched using a variety of media: the Victorian Order of Nurses (VON) sent out newsletters; posters and flyers were posted and faxed throughout the Peterborough area; local rheumatologists advertised the research project in their offices; local health and social services were advised of the research project; a community forum was held to provide information about the study and to recruit volunteers; word of mouth, local newspaper advertisements and the local cable company all advertised the research project.

Registration occurred on a voluntary, phone-in-basis to The Arthritis Society and the VON. People who registered were contacted by phone, at which time verbal consent to participate in the study was obtained, questions were asked re: inclusion and exclusion criteria and the Physical Activity Readiness Questionnaire (PAR-Q)[3] was administered.

The study population included community-living adults (18+ years) with self-reported arthritis who volunteered and consented to participate in the study. Subjects were included into the study if they could read and write English and were available for the duration of the study. Subjects were excluded if they had contraindications to exercise such as an unstable heart condition, seizures, etc., had been enrolled in an organized exercise program during the last three months, or had a lower limb joint replacement in the last three months.

2.2 Assessments

Prior to the start of the program, all participants were asked to complete a written

consent (Appendix 1) as well as a questionnaire consisting of demographic information and a series of outcome measures (Appendix 2). Each participant was asked to select their preferred exercise program, land-based or water-based.

Assessments were conducted at a neutral location. To maintain anonymity, participants were asked to place their completed self-report questionnaires into an envelope before handing them in. Trained health-care professional assessors recorded resting heart rate and blood pressure, measured weight and height (Appendix 3), and administered the "Timed Up and Go" (Appendix 4), a measure of physical mobility. Assessors were blinded to group assignment. All measurements and questionnaires were administered by the same assessors at baseline, at the end of the 10-week intervention and at 3-month follow-up.

2.3 Intervention

The program was conducted twice a week for 10 weeks. The land-based interventions took place at the Peterborough Goodlife Fitness Centres and was modeled after the American Arthritis Foundation's "People with Arthritis Can Exercise" program (PACE), a community-based, non-clinical program that involves group participation[26]. Activities were designed to improve certain physical parameters such as endurance and joint motion and encouraged peer interaction and socialization. The pool-based program took place at the Peterborough branch of the YMCA and was modeled after The Arthritis Society Aquatics Program (ASAP), which is a recreational pool program that encourages group participation. ASAP has standardized content based on two documents, the Arthritis Foundation guidelines[27] which emphasize exercises to increase range of motion, and guidelines developed by the Arthritis Community Research and Evaluation Unit (ACREU) in 1994[28]which include ROM exercises and add an aerobic component to the program. A previous ACREU evaluation has shown that participants of this program reported benefits, particularly less pain[29]. Program instructors were paid by the YMCA or Goodlife Fitness Centers and trained by an Arthritis Society physiotherapist.

The instructors monitored attendance at each session. To be considered compliant, participants were required to attend at least 16 out of the 20 sessions (80% compliance).

2.4 Outcome measures (Appendix 2):

Primary outcome:

1. The Lower Extremity Functional Scale (LEFS)[30]

The LEFS is a 20-item self-administered scale measuring lower extremity function. Each item is scored from 0 (extreme difficulty/unable to perform) to 4 (no difficulty). The scores are added with a total possible score of 80. A higher score indicates less disability. The LEFS has shown excellent test-retest reliability (R=.94), validity and sensitivity to change in outpatients with lower extremity musculoskeletal dysfunction receiving 4 weeks of physiotherapy. The minimal clinically important difference is 9.

Secondary outcomes:

2. Health Related Quality of Life Assessment (SF-36)[31]

This questionnaire includes one multi-item scale measuring each of eight health concepts: physical functioning, role limitations due to physical health problems, bodily pain, general health, vitality (energy/fatigue), social functioning, role limitations due to emotional problems and mental health (psychological distress and psychological well-being). It is self-administered and measures a person's general health and well-being. A higher score represents better status except for the Health Transition question. It has been extensively tested and shown to be reliable and valid in different populations[32-34].

3. Centre for Epidemiologic Studies – Depression Scale (CES-D)[35]

The CES-D is a short questionnaire measuring psychological distress over a one-week period and has been used mostly for research purposes in non-psychiatric populations.

Good internal consistency has been reported (Cronbach's alpha: 84 – 90). A score of 16 or greater represents clinical depression.

4. Visual Analogue Scales for Pain (VAS-P) and Stiffness, (VAS(S))[36-39]

Visual analogue scales (VAS) were used to assess general pain and stiffness over the past week using a 0-10 cm scale with 0 = no pain/stiffness and 10 = worst possible pain/stiffness.

5. Joint Identification Figure (Homunculus: Appendix 5)

Participants were asked to complete a homunculus to identify which of their joints were involved. Self-assessed joint counts have been found to be reliable and responsive[40,41,] although they do not always correlate well with an assessor's joint counts[41-44].

6. Timed Up and Go[45,46]

The Timed Up and Go test [45], developed from Mathias' Get Up and Go test [46], measures basic mobility and has been used both clinically and for research purposes. It has been used in the frail elderly with a wide variety of physical conditions including rheumatoid arthritis. Instructions are standardized as follows. The participant begins seated in an armchair and on the word 'Go' is asked to rise from the chair, stand still momentarily, walk at a self-selected speed (with usual shoes and assistive devices) to the wall three metres away, turn (without touching the wall), return, turn around and sit down again. After one practice run, the participant is scored according to the time in seconds required to complete the task, measured using a stopwatch. A higher score indicates that it takes longer to do the task. The inter-rater reliability has been reported as high (r=.99). Test-retest reliability was reported as .99 with three days to five weeks between assessments using the same observer. The Timed Up and Go has shown moderate correlations with gait speed (.75), balance measured by the Berg Balance Scale (-.72) and function measured by the Barthel index (-.51).

7. Post-Intervention and Follow-up Assessments

At the post-intervention and follow-up assessments, participants were asked whether they had changed their medications, had any other medical interventions (e.g. joint injection), or participated in any other activities which may have affected their joints (e.g. other therapy, other exercise) (Appendix 6). They were also asked whether, as a result of the exercise, they had changed their arthritis medications, their dependence on assistive devices, mobility devices (e.g. cane, walker, etc.) or help from others, their visits to the general physician, rheumatologist, physiotherapist, chiropractor, or other health professional, or their participation in other forms of exercise. Participants were asked if they intended to join an ongoing community program in order to continue their exercises. These questions have been used previously in a hydrotherapy study[29].

2.5 Data Analysis

Chi-squared and independent sample t-tests were used to compare the demographic and physical characteristics of the two groups at baseline. Paired t-tests were used to assess changes from baseline. Change scores were calculated between baseline and post-intervention and between post-intervention and the 3-month follow-up. Independent sample t-tests were used to compare change scores between the land-based and pool-based exercise groups. The level of statistical significance was adjusted for multiple comparisons, using the Bonferroni method and set at $\leq .003$.

2.6 Sample Size

We used the LEFS as the primary outcome measure in this study. Developmental work with the LEFS tool, the minimal clinically important difference between the two groups at discharge was set at 9 points[30]. Based on this same work and a previous study of physiotherapy in lower extremity musculoskeletal disease, the standard deviation (SD) was set at 16[47]. The sample size was calculated at 25 per group (50 total), with a two-

tailed alpha of 0.05 and beta of 0.20. Allowing for a 10% drop-out rate, the sample size was set at 50/0.9 = 55 and rounded up to 60 (30 per group).

3.0 RESULTS

Recruitment strategies resulted in 129 telephone inquiries, 111 of which consented and were eligible for the study. In April 2000, 79(71%) of potential participants were assessed and entered into the study. Of these, 4(5%) changed their minds, 3(4%) found the exercises too difficult, 3(3.5%) had work conflicts, 2(2.5%) withdrew because of family issues and 1(1%) found the exercises were not helping. The remaining 66(84%) participated in and completed the exercise program (n=28 land, n=38 water). A total of 59(89%) participants (n=23 land, n=36 water) attended at least 16 sessions (80% compliance) and of the 59 participants, 45 (76%) returned for a 3-month follow-up (17 land, 28 water).

Table 1 reports the baseline characteristics of those participants who entered the study (n=79). The average age was 59 years (SD:12.8); range: 24 to 82 years. Most participants were female (82%); 54% were married. Diagnoses included osteoarthritis (28%), rheumatoid arthritis (14%), and other types of arthritis (18%); 41% reported multiple types of arthritis. Average Body Mass Index (BMI) was 29.7; 29% reported having at least one joint surgery for arthritis. There were no significant differences between the participants in the land and water exercise groups at baseline (p>.09).

Baseline assessments: At baseline, there were no statistical differences between the participants in the two exercise groups (n=79) for the self-report, physical or performance measures (Table 2). However, there was a clinically important difference between the groups with the pool group reporting worse lower extremity function (LEFS = 47.5 for land and 38.6 for pool). There was also a trend for those in the pool exercise group to report worse general health (SF-36-GH, p=.018), and worse mental health (SF-36-MH,

p=.023).

Post-Assessment: Table 3 presents a comparison of outcome measure scores for those participants who attended at least 80% of the exercise sessions (n=59). At 10 weeks, there were improvements from baseline in the TUG for both groups ($p<.003$). The land exercise group showed significant improvements from baseline in the SF-36 physical functioning ($p=.001$), and the water exercise group showed significant improvements in the SF-36 mental health and reported health transition ($p<.002$). There were clinically important improvements from baseline in the LEFS scores for both groups (mean change: ≥9). There were no significant differences between the groups at 10 weeks ($p>.003$). However, the water exercise group showed trends towards better general health, SF-36-GH, ($p=0.062$) and mental health, SF-36-SF ($p=0.035$). There were no significant increases in pain or joint homunculus scores.

Table 4 reports the results combining the scores for the two exercise groups (n=59). There were improvements at 10 weeks in SF-36 (vitality, health transition, mental health) and the TUG ($p\leq.003$). There were no significant increases in pain or joint homunculus scores.

3-Month Follow-Up: Table 5 presents a comparison of post intervention and 3-month scores for the 45 participants available for follow-up. All improvements were maintained at follow-up. There were no significant differences between the groups ($p>.003$). Table 6 presents the combined results for both groups. There was a significant increase in CES-D depression scores at 3-month follow-up ($P<.001$).

Tables 7 and 8 report the responses to questions about service use and changes in disease and functional status as a result of the exercise intervention (post-intervention and at three month follow-up). Examination of post intervention shows there was a trend for more people in the water group to report that their pain decreased ($p=.061$). Combining

the groups, 75% indicated that their pain had decreased a little or a lot. At three-month follow-up, more people in the water exercise group indicated that their need for help from others decreased (p=.001) and that they would join another exercise group (p=.003). There was also a trend towards improved flexibility (p=.006) and decreased use of pain medications (p=.009).

4.0 DISCUSSION

Participants were allowed to select either a pool or a land-based program. Clients were similar in both groups; however, the results suggest that people with more severe disease (worse lower extremity function, worse general health and worse mental health) may prefer exercise in water.

Our results support earlier work that has demonstrated that people with arthritis, including those who have had joint surgery and those who are obese, can exercise safely without exacerbating their joint symptoms [5-10,20-22,24,29,48,49]. In terms of outcome, there were few differences between the water and land exercise groups suggesting that either type of exercise can benefit people with arthritis. There were no significant differences between the groups at 10 weeks; however, both groups reported clinically important improvements from baseline in lower extremity function scores, our primary outcome. Comparing groups, the land exercise group showed trends towards better vitality, improved physical role functioning, better reported health transition, and less depression. The water exercise group showed trends towards less pain, better vitality, better social functioning, and better lower extremity function. Post intervention questions suggested that those participants in the pool group had more benefit in terms of gaining flexibility and reducing their need for pain medications and help from others, however further randomized controlled studies are required to confirm these findings.

The group in general had an average BMI higher than the healthy average[50]. This may put them at risk for increased morbidity and mortality. This is a concern for the general health of this population, but specifically is a concern for their joints and their ability to remain mobile and function independently. Weight reduction is a recommended pain management strategy for OA[51-53]. There was no decrease in BMI over the course of the study. Though weight reduction was not the primary aim of this study, a longer exercise intervention and a multi-dimensional approach to weight management may be warranted particularly to help those with OA reduce their weight and the stress on their joints. We did not define or measure the level of exertion during this study. This would need to be monitored in any subsequent study in order to ensure that participants received an aerobic training effect, which might in turn, help with weight loss.

All improvements were maintained at the three-month follow-up. One surprise finding was that depression was significantly worse. This may reflect participants feeling more isolated once the group program stopped and contact with study personnel decreased. Minor et al reported improvements in depression following 12 weeks of aerobic walking or aerobic aquatics[10]. Future studies need to pay attention to the psychosocial benefits of exercising in a group setting and consider the value of ongoing support. It may also be important for communities to provide long-term exercise opportunities for people with arthritis so that the physical and psychosocial benefits of group exercise are not lost. There were also some significant events that happened to some of the participants (loss of a spouse, loss of a family pet, family illness, loss of job, etc.) between the 10 week and 3 month follow-up assessments that may help to explain these findings.

4.1 Study Limitations

We did not reach our sample size requirements for this study; therefore, we may

have been under-powered to detect significant differences between the two groups. As well, the intensity of the intervention (frequency of sessions and/or length) may not have been enough to bring about change. A study with more frequent sessions and longer length of intervention is likely needed. Since there was no control group, improvements may have been due to the normal fluctuations in the course of these diseases or reflect regression to the mean. Since the participants were not randomized to the groups, there may have been unknown confounding variables influencing the results of this study.

There were a few barriers to participation in this project:

- The health facilities used were not wheelchair accessible. The gyms were located up several stairs, limiting access for anyone with a walking disability.
- The project had limited class times offered for people who worked.
- People living in rural communities without transportation were unable to participate in the study.

These study results can be used to guide the development of future programs and help health providers counsel individuals regarding appropriate exercise choices. Results suggest that communities need to provide a variety of long-term exercise opportunities for community dwelling people with arthritis. Future recommendations include partnering with various organizations to encourage exercising. Since there is a link between recreation and health, we would suggest that exercise programs be offered through services such as the Institute for Healthy Aging and local recreational facilities.

5.0 ACKNOWLEDGEMENTS

We express our appreciation to Linda Rothman from ACREU for her assistance in proposal writing; Judith Sullivan (for her assessment assistance) and Michele Nicholls (for her financial assistance) both from the Peterborough VON; the many volunteers, especially Marg Hawkins who volunteered many hours using her nursing and assessment skills and Cathy Debbert for data entry.

6.0 REFERENCES

1. Arthroscope 2000. Arthritis and the aging population: Projections of arthritis prevalence in Canada, 1991 to 2031. Badley EM, Wang PP. 2000.

2. Badley EM, Williams JI. ICES Practice Atlas: Arthritis & Related Conditions.1998 Institute for Clinical Evaluative Sciences.

3. Canada's Physical Activity Guide to Healthy Active Living. Health Canada.1998.

4. Walker JM. Pathophysiology of inflammation, repair and immobility. In: Walker JM, Helewa A. Physical Therapy in Arthritis. Toronto.W.B. Saunders.1996;19-45.

5. Minor MA. Physical activity and the management of arthritis. Annals of Behavioural Medicine 1991;13:3:117-23.

6. Van den Ende CHM, Vliet Vlieland TPM, Munneke M, Hazes JMW. Dynamic exercise therapy in rheumatoid arthritis: a systematic review. Br J Rheumatol 1998;37:677-87.

7. Fisher NM, Pendergast DR. Effects of a muscle exercise program on exercise capacity in subjects with osteoarthritis. Archives of Physical Medicine and Rehabilitation 1994;75:792-97.

8. Ettinger WH, Burns R, Messier SP, Applegate W, Rejeski WJ, Morgan T, Shumaker S, Berry MJ, O'Toole M, Monu J, Craven T. A randomized trial comparing aerobic exercise and resistance exercise with a health education program in older adults with knee osteoarthritis: the Fitness Arthritis and Seniors Trial. JAMA 1997;277:1:25-31.

9. Elsbett-Koeppen RH, Badley EM. Nonpharmacological treatment modalities in the treatment of arthritis: patient education, exercise and social support. ACREU working paper 98-4, June 1998.

10. Minor MA, Hewett JE, Webel RR, Anderson SK, Kay DR. Efficacy of physical conditioning exercise in patients with rheumatoid arthritis and osteoarthritis. Arthritis Rheum 1989;32(11):1396-1405.

11. Levin S. Aquatic therapy: a splashing success for arthritis and injury rehabilitation. The Physician and Sports Medicine 1991:19(10):119-26.

12. Glass J. Physical medicine in rheumatology. Australian New Zealand Journal of Medicine 1978: Supplement 1:8:168-71.

13. Swezey RL. Essentials of physical management and rehabilitation in arthritis. Seminars in Arthritis and Rheumatism 1974:3:4:349-68.

14. Golland A. Basic Hydrotherapy. Physiotherapy 1981:67:9:258-62.

15. Basmajian JV. Exercises in water. In Therapeutic Exercise, 4th edition, ed. JV Basmajian, Baltimore: Williams and Wilkins, 1984.

16. Tinsley LM, Laing B. Hydrotherapy in rheumatic disease and fibrositis. In Adult Hydrotherapy: A Practical Approach. Ed. MR Campion, Oxford: Heinemann Medical Books, 1990.

17. Wickersham BA, Hydrotherapy in Rheumatic Diseases: Rehabilitation and Management. eds. GK Riggs, EP Gall, Boston: Butterworth Publishers 1984.

18. Skinner AT, Thomson AM (Eds) The Treatment of Rheumatic Disorders. In: Duffield's Exercise in Water, 3rd edition. Bailliere Tindall, London, 1986;105-124.

19. Tork SC, Douglas V. Arthritis water exercise program evaluation: a self-assessment survey. Arthritis Care and Research 1989:2(1):28-30.

20. Danneskiold-Samsoe B, Lyngberg K, Risum T, Telling M. The effect of water exercise therapy given to patients with rheumatoid arthritis. Scandinavian Journal of Rehabilitation Medicine 1987:19:31-5.

21. Dial C, Windsor RA. A formative evaluation of a health education - water exercise program for class II and III rheumatoid arthritis patients. Patient Education and Counselling 1985:7:1:33-2.

22. Hall J, Skevington SM, Maddison PJ, Chapman K. A randomized and controlled trial of hydrotherapy in rheumatoid arthritis. Arth Care Res 1996;9:3;206-15.

23. Avellini BA, Shapiro Y, Pandolf KB. Cardio-respiratory physical training in water and on land. European J Applied Physiology 1983;50;255-63.

24. Green J, McKenna F, Redfern EJ, Chamberlain MA. Home exercises are as effective as outpatient hydrotherapy for osteoarthritis of the hip. Br J Rheumatol 1993;32:812-15.

25. Meyer CL, Characteristics of participants in water exercise programs compared to patients seen in a rheumatic disease clinic. Arth Care Res 1994;7:2:85-9.

26. The Arthritis Foundation. People with Arthritis Can Exercise (PACE) program. The Arthritis Foundation, Atlanta, Georgia USA:1993.

27. YMCA Aquatics Program - Guidelines, Arthritis Foundation, 1996.

28. Hawker G, Lineker S, Narduzzi J, McBay L. Development of an Arthritis Hydrotherapy Program. ACREU Working Paper 94-4, 1994.

29. Lineker SC, Badley EM, Hawker G, Wilkins A. Determining sensitivity to change in outcome measures used to evaluate community hydrotherapy programs for people with rheumatic diseases. Arthritis Care and Research 2000:13:1;62-5.

30. Binkley JM Stratford PW, Lott SA, Riddle DL, The North American Orthopaedic Rehabilitation Research Network. The lower extremity functional scale (LEFS): Scale Development, Measurement Properties, and Clinical Application. Physical Therapy 1999;79:371-383.

31. SF-36 Health Status Questionnaire: User's Manual, 1991.

32. Stewart AL, Hays RD, Ware JE Jr. The MOS short-form general health survey: reliability and validity in a patient population. Medical Care 1988;26:72.

33. Ware JE, Sherbourne CE. The MOS 36-item short-form health survey (SF-36):I. Conceptual framework and item selection. Medical Care 1992;30:473-83.

34. Ware JE, Snow KK, Kosinski M, Gandek B. SF-36 Health survey manual and interpretation guide. Boston: The Health Institute, New England Medical Centres Hospitals, 1993.

35. Devins GM, Orme CM, Costello CG, Binik YM, Frizzell B, Stam HJ, Pullin WM (1988) Measuring depressive symptoms in illness populations: psychometric properties of the Center for Epidemiologic Studies Depression (CES-D) Scale. Psychology and Health, 2:139-56.

36. Revill, S., Robinson, J.Rosen, N., & Hogg, M. (1976). The reliability of a linear analogue for evaluating pain. Anaesthesia, 31, 1191-1198.

37. Price, D.D., McGrath, P.A., Raffi, A., & Buckingham, B. (1983). The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. Pain, 17, 45-56.

38. Guyatt, G.H., Townsend, M., Berman, L.B., & Keller, J.L. (1987). A comparison of likert and visual analogue scales for measuring change in function. Journal of Chronic Disease, 40, 1129-1133.

39. Bellamy, N. (1988). Methods of clinical assessment of antirheumatic drugs. Bailliere's Clinical Rheumatology, 2, 339-361.

40. Escalante A. What do self-administered joint counts tell us about patients with rheumatoid arthritis? Arthritis Care and Research 1998; 11:280-90

41. Van Gestel AM, van Riel PLCM. Evaluation of early rheumatoid arthritis disease activity and outcome. Baillier's Clinical Rheumatology 1997; 11:49-53.

42. Calvo FA, Calvo A, Berrocal A, Pevez, C, Romero F, Vega E, Visga RCM, de la Cruz RA, Alarcon GS. Self-administered joint counts in rheumatoid arthritis: comparison with standard joint counts. J Rheumatology 1999;26:536-9.

43. Alarcon GS, Tilley BC, Li S, Fowler SE, Pillemer Sr and the MIRA Trial Group. Self-administered joint counts and standard counts in the assessment of rheumatoid arthritis. J Rheumatol 1999;25:1065-7.

44. Hanly JF, Mosher D, Sutton E, Weerasinghe S, Theriault D. Self assessment of disease activity by patients with rheumatoid arthritis. J Rheumatol 1996;23:1531-8.

45. Podsiadlo D, Richardson S. The Timed 'Up and Go': a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc 1991;39:142-8.

46. Mathias S, Nayak USL, Isaacs B. Balance in elderly patients: the "Get Up and Go" test. Arch Phys Med Rehabil 1986;67:387-9.

47. Lineker SC, Wilkins A. Practice review of the physiotherapy management of lower extremity musculoskeletal disease. Report to the College of Physiotherapists of Ontario. Arthritis Community Research and Evaluation Unit (ACREU), Toronto, 2000.

48. Alexander MJL, Butcher JE, MacDonald PB. Effect of a water exercise program on walking gait, flexibility, strength, self-reported disability and other psycho-social measures of older individuals with arthritis. Physiotherapy Canada 2001;203-11.

49. Gowans SE, deHueck A, Voss S, Richardson M. A randomized, controlled trial of exercise and education for individuals with fibromyalgia. Arth Care Res 1999;12:2:120-8.

50. Kuczmarski RJ, Flegal M. Criteria for the definition of overweight in transition: background and recommendations for the United States. Am J Clin Nutrition 2000;72:5;1074-1081.

51. Holbrook AM (Chair) for Ontario Musculoskeletal Therapy Review Panel. Ontario Treatment Guidelines for Osteoarthritis, Rheumatoid Arthritis, and Acute Musculoskeletal Injury. Toronto. Queen's Printer of Ontario, 2000.

52. Recommendations for the medical management of osteoarthritis of the hip and knee: 2000 update. American College of Rheumatology Subcommittee on Osteoarthritis Guidelines. Arthritis Rheum. 2000;43:9:1905-15.

53. Mazieres B, Bannwarth B, Dougados M, Lequesne M. EULAR recommendations for the management of knee osteoarthritis. Report of a task force of the Standing Committee for International Clinical Studies Including Therapeutic Trials. Joint Bone Spine 2001;68:3:231.

Table 1: Comparisons of Baseline Characteristics by Exercise Group (Using χ^2 and independent sample t-test)

Characteristics	Both Groups* (n=79)	Land* (n=35)	Water* (n=44)	p-value
Age (Mean, SD)	59.0 (12.8)	61.0 (11.9)	57.4 (13.4)	0.214
Gender:				
Male	14 (17.7)	6 (17.1)	8 (18.2)	
Female	65 (82.3)	29 (82.9)	36 (81.8)	0.573
Marital status:				
Married/Common Law	44 (55.7)	24 (68.6)	20 (45.5)	
Not married	35 (44.3)	11 (31.4)	24 (54.5)	0.040
Education:				
Lower education	37 (46.8)	17 (48.6)	20 (45.5)	
Higher education	42 (53.2)	18 (51.4)	24 (54.5)	0.783
Height (in meters)	1.64 (0.1)	1.63 (0.1)	1.65 (0.1)	0.479
Weight (in kilograms)	79.8 (20.4)	80.0 (20.8)	79.6 (20.4)	0.935
Resting Heart Rate (beats per minute)	67.7 (10.4)	69.9 (11.9)	66.0 (8.7)	0.091
Blood Pressure (Average of 3 measures):				
Systolic	126.1 (16.3)	128.6 (15.0)	124.1 (17.2)	0.222
Diastolic	77.4 (10.8)	78.4 (9.2)	76.6 (12.0)	0.440
BMI	29.7 (7.4)	30.0 (7.5)	29.4 (7.4)	0.725
Type of Arthritis:				
OA	22 (27.8)	11 (31.4)	11 (25.0)	
RA	11 (13.9)	3 (8.6)	8 (18.2)	0.672
Other	14 (17.7)	6 (17.2)	8 (18.2)	
Multiple Types	32 (40.5)	15 (42.9)	14 (38.6)	
Duration (in years) (Mean, SD)	11.1 (10.3)	10.5 (9.2)	11.5 (11.2)	0.673
Ever had joint surgery:				
Yes	23 (29.1)	10 (28.6)	13 (29.5)	
No	56 (70.9)	25 (71.4)	31 (70.5)	0.925

p-value adjusted for multiple comparisons (outcome measures adjusted by using Bonferroni method: 0.05/15): level of sign.: $\alpha = 0.0033$

* Number (%) or Mean (SD)

Table 2: Comparisons of Pre-Intervention Outcome Measures by Exercise Group (using independent sample t-test)

Outcome measure	Pre-Intervention		p-value
	Land Exercise Group (n=35) Mean (SD)	Water Exercise Group (n=44) Mean (SD)	
SF36 – PF	46.3 (19.9)	43.0 (22.9)	0.499
- RP	38.6 (40.4)	31.8 (38.3)	0.449
- BP	46.1 (19.0)	39.6 (18.3)	0.126
- GH	64.8 (21.4)	53.8 (19.2)	0.018
- VT	50.0 (21.9)	46.0 (24.4)	0.455
- SF	73.9 (28.8)	67.6 (25.8)	0.308
- RE	66.7 (44.3)	65.9 (42.2)	0.938
-MH	76.3 (15.3)	67.5 (17.9)	0.023
-HT	3.1 (0.8)	3.2 (1.0)	0.674
VRS – S	45.9 (22.2)	51.2 (22.2)	0.323
- P	47.1 (22.7)	54.6 (25.2)	0.179
CES-D	13.1 (9.5)	15.3 (8.8)	0.280
LEFS	47.5 (15.0)	38.6 (17.0)	0.017
Homunculus	7.3 (3.6)	8.1 (5.0)	0.382
TUG	10.2 (2.8)	10.7 (2.4)	0.369

p-value adjusted for multiple comparisons (outcome measures adjusted by using Bonferroni method: 0.05/15): level of sign. $\alpha = 0.003$

Table 3: Comparisons of Pre- and Post-Intervention Outcome Measure Values and Change Scores by Exercise Group (n=59)

	Land Exercise (n=23)			Water Exercise (n=36)			Land Exercise (n=23)	Water Exercise (n=36)	p-value for change score
Outcome measure	Pre-intervention Mean (SD)	Post-intervention Mean (SD)	p-value	Pre-intervention Mean (SD)	Post-intervention Mean (SD)	p-value	Change Score Mean (SD)	Change Score Mean (SD)	
SF36 – PF	45.0 (18.8)	55.4 (20.6)	0.001*	45.0 (21.6)	47.1 (22.5)	0.515	14.3 (9.0)	15.1(11.4)	0.779
- RP	40.2 (41.8)	51.1 (40.2)	0.076	34.7 (38.9)	45.8 (44.5)	0.132	19.6 (22.6)	29.2 33.5)	0.194
- BP	47.1 (19.7)	48.1 (18.5)	0.810	39.9 (18.2)	46.8 (16.9)	0.011	14.4 (13.1)	13.3 10.3)	0.730
- GH	63.7 (22.2)	65.1 (20.3)	0.588	54.5 (19.4)	59.1 (22.8)	0.114	8.2 (8.4)	13.3 11.4)	0.062
- VT	47.2 (21.9)	52.8 (16.4)	0.050	49.0 (24.4)	55.6 (21.5)	0.023	10.0 (10.0)	12.9(12.0)	0.337
- SF	73.4 (30.2)	81.0 (18.0)	0.196	69.1 (25.8)	78.1 (22.4)	0.014	18.5 (21.3)	16.0 16.3)	0.611
- RE	69.6 (42.5)	79.7 (34.4)	0.338	63.9 (43.4)	70.41(41.2)	0.361	30.4 (40.1)	25.0(34.2)	0.580
-MH	78.1 (17.0)	80.7 (14.4)	0.246	67.2 (19.2)	77.2 (17.6)	0.000*	7.5 (7.7)	13.3(11.4)	0.035
-HT	3.1 (0.8)	2.7 (1.0)	0.030	3.2 (0.9)	2.6 (1.0)	0.001*	0.6 (0.8)	0.7 (1.0)	0.725
VRS – S	48.4 (24.1)	46.3 (21.6)	0.879	50.3 (21.4)	49.4 (22.4)	0.831	11.3 (11.9)	12.7(11.1)	0.713
- P	46.1 (22.7)	44.4 (20.0)	0.736	52.8 (25.1)	47.2 (20.7)	0.077	17.4 (16.8)	13.3(13.5)	0.312
CES-D	13.1 (10.5)	10.0 (5.7)	0.047	14.4 (8.9)	12.7 (8.6)	0.221	4.8 (5.9)	5.8 (6.0)	0.563
LEFS	46.9 (13.8)	47.5 (11.7)	0.818	39.9 (15.9)	45.4 (15.9)	0.022	9.0 (7.2)	11.4 (9.3)	0.288
Homunculus	7.2 (3.5)	7.3 (3.4)	0.827	7.9 (4.7)	7.2 (4.4)	0.161	2.0 (1.9)	1.9 (2.4)	0.869
TUG	10.5 (3.1)	9.0 (1.9)	0.002*	10.4 (2.5)	8.8 (2.4)	0.000*	1.6 (1.7)	1.9 (1.6)	0.469

p-value adjusted for multiple comparisons (outcome measures adjusted by using Bonferroni method: 0.05/15): level of sign.: $\alpha = 0.003$ * significant

Table 4: Comparisons of Pre- and Post-Intervention Outcome Measure Values and Change Scores for the Combined Exercise Groups (n=59)

	Both Exercise Groups (n=59)		
Outcome measure	**Pre-intervention Mean (SD)**	**Post-intervention Mean (SD)**	**p-value**
SF36 - PF	45.0 (20.4)	50.3 (22.0)	0.022
- RP	36.9 (39.8)	47.9 (42.6)	0.029
- BP	42.7 (19.0)	47.3 (17.4)	0.046
- GH	58.1 (20.8)	61.4 (21.9)	0.097
- VT	48.3 (23.3)	54.5 (19.6)	0.003*
- SF	70.8 (27.4)	79.3 (20.7)	0.008
- RE	66.1 (43.1)	74.0 (38.7)	0.180
-MH	71.5 (19.0)	78.6 (16.4)	0.000*
-HT	3.2 (0.9)	2.4 (1.0)	0.000*
VRS - S	49.1 (23.2)	49.8 (21.9)	0.790
- P	50.2 (24.3)	46.1 (20.3)	0.138
CES-D	13.9 (9.5)	11.7 (7.7)	0.030
LEFS	42.6 (15.4)	46.2 (14.3)	0.041
Homunculus	7.6 (4.2)	7.2 (4.0)	0.316
TUG	10.4 (2.7)	8.9 (2.2)	0.000*

p-value adjusted for multiple comparisons (outcome measures adjusted by using Bonferroni method: 0.05/15): level of sign.: $\alpha = 0.003$;
*significant

Table 5: Comparisons of Post- and Three-month Post-Intervention Outcome Measure Values and Change Scores by Exercise Group

	Land Exercise (n=17)			Water Exercise (n=28)			Land Exercise (n=17)	Water Exercise (n=28)	p-value for change scores
Outcome measure	**Post-intervention Mean (SD)**	**3 mth-post-intervention Mean (SD)**	**p-value**	**Post-intervention Mean (SD)**	**3 mth-post-intervention Mean (SD)**	**p-value**	**Change Score Mean (SD)**	**Change Score Mean (SD)**	
SF36 – PF	62.6 (17.2)	53.8 (16.0)	0.024	45.7 (20.9)	46.8 (21.9)	0.739	12.9 (10.9)	11.4 (12.2)	0.678
- RP	51.5 (41.0)	45.6 (40.7)	0.450	47.3 (45.8)	42.9 (45.1)	0.532	20.6 (23.8)	20.5 (31.2)	0.995
- BP	47.2 (16.8)	48.6 (13.5)	0.724	47.7 (17.6)	53.2 (18.1)	0.154	11.6 (11.0)	15.1 (13.7)	0.377
- GH	66.6 (18.2)	68.2 (15.5)	0.559	57.1 (22.5)	63.6 (24.5)	0.041	8.8 (6.4)	12.8 (11.6)	0.202
- VT	54.7 (14.6)	51.8 (18.7)	0.530	53.6 (23.4)	55.0 (25.3)	0.583	15.3 (10.8)	9.3 (9.9)	0.063
- SF	83.8 (14.5)	80.9 (16.6)	0.431	75.9 (23.8)	77.2 (22.8)	0.704	10.3 (11.0)	12.1 (13.8)	0.658
- RE	86.3 (31.3)	76.5 (40.4)	0.264	69.0 (42.5)	67.9 (45.8)	0.887	17.6 (31.4)	22.6 (37.5)	0.650
-MH	83.3 (11.4)	80.5 (15.4)	0.352	75.0 (19.3)	75.7 (21.3)	0.779	8.4 (8.4)	9.6 (9.1)	0.818
-HT	2.7 (0.9)	3.2 (0.6)	0.560	2.4 (1.0)	2.5 (1.0)	0.404	0.6 (0.9)	0.6 (0.7)	0.943
VRS – S	38.9 (16.2)	51.0 (20.2)	0.084	48.6 (20.3)	42.7 (18.8)	0.179	14.4 (16.7)	17.2(10.2)	0.506
- P	40.6 (16.0)	47.1 (20.5)	0.306	47.1 (19.0)	41.4 (21.0)	0.151	20.6 (15.2)	15.7 (14.0)	0.279
CES-D	9.6 (5.5)	13.1 (8.1)	0.047	12.9 (8.4)	14.1 (10.2)	0.131	5.7 (4.8)	2.6 (3.4)	0.013
LEFS	49.8 (11.8)	48.6 (11.7)	0.626	42.2 (15.9)	46.0 (17.4)	0.748	7.2 (5.7)	7.9 (9.3)	0.793
Homunculus	7.8 (3.4)	8.3 (3.4)	0.372	7.7 (4.7)	8.1 (5.4)	0.512	1.8 (1.6)	2.1 (2.3)	0.657
TUG	9.1 (1.8)	9.6 (2.5)	0.370	8.9 (2.5)	9.2 (2.3)	0.571	1.6 (1.5)	1.8 (1.5)	0.539

p-value adjusted for multiple comparisons (outcome measures adjusted by using Bonferroni method: 0.05/15): level of sign.: $\alpha = 0.003$
* significant

Table 6: Comparisons of Post- and Three-Month Post-Intervention Outcome Measure Values and Change Scores for the Total Group (n=45)

	Both Exercise Groups (n=45)		
Outcome measure	**Post-intervention Mean (SD)**	**3 mth post-intervention Mean (SD)**	**p-value**
SF36 - PF	52.1 (21.1)	49.4 (19.9)	0.287
- RP	48.9 (43.6)	43.9 (43.0)	0.340
- BP	47.5 (17.1)	51.4 (16.5)	0.158
- GH	60.7 (21.3)	65.4 (21.5)	0.036
- VT	54.0 (20.4)	53.8 (22.9)	0.925
- SF	78.9 (21.0)	78.6 (20.6)	0.914
- RE	75.6 (39.2)	71/1 (43.6)	0.466
-MH	78.1 (17.1)	77.5 (19.3)	0.747
-HT	2.5 (0.9)	2.8 (1.0)	0.057
VRS – S	45.8 (19.5)	45.2 (19.6)	0.865
- P	44.7 (18.0)	43.6 (20.8)	0.746
CES-D	11.6 (7.6)	17.0 (8.9)	0.000*
LEFS	46.9 (14.5)	47.0 (15.4)	0.979
Homunculus	7.7 (4.2)	8.2 (4.7)	0.300
TUG	9.0 (2.2)	9.3 (2.4)	0.320

p-value adjusted for multiple comparisons (outcome measures adjusted by using Bonferroni method: 0.05/15): level of significance: $\alpha = 0.003$;
*significant

Table 7: Comparisons of Post Intervention Questions by Exercise Group (Using χ^2)

Post-Intervention Questions	Both Exercise Groups (n=59) Number (%)	Land Exercise (n=23) Number (%)	Water Exercise (n=36) Number (%)	p-value
Done other therapy:*				
Physiotherapy	50 (84.7)	20 (87.0)	30 (83.3)	
Occupational Therapy	1 (1.7)	0	1 (2.8)	
Naturopath	0	0	1 (2.8)	0.719
Steroid Injections	1 (1.7)	0	0	
Change of Medication	7 (11.9)	3 (13.0)	4 (11.1)	
Result of exercise:				
Much better now	14 (23.7)	4 (17.4)	10 (27.8)	
Somewhat better now	35 (59.3)	13 (56.5)	22 (61.1)	0.280
About the same	10 (16.9)	6 (26.1)	4 (11.1)	
Much worse now	0	0	0	
Result of exercise - flexibility:				
Much better now	15 (25.4)	4 (17.4)	11 (30.6)	
Somewhat better now	33 (55.9)	12 (52.2)	21 (58.3)	0.145
About the same	11 (18.6)	7 (30.4)	4 (11.1)	
Much worse now	0	0	0	
Result of exercise - help from others:				
Decreased a lot	8 (13.6)	1 (4.3)	7 (19.4)	
Decreased a little	9 (15.3)	4 (17.4)	5 (13.9)	0.512
Not changed	23 (39.0)	11 (47.8)	12 (33.3)	
Increased a little	3 (5.1)	1 (4.3)	2 (5.6)	
Increased a lot	0	0	0	
Not applicable	16 (27.1)	6 (26.1)	10 (27.8)	
Result of exercise - use of walking devices:				
Decreased a lot	4 (6.8)	1 (4.3)	3 (8.3)	
Decreased a little	4 (6.8)	1 (4.3)	3 (8.3)	
Not changed	12 (20.3)	5 (21.7)	7 (19.4)	0.858
Increased a little	0	0	0	
Increased a lot	0	0	0	
Not applicable	39 (66.1)	17 (69.6)	23 (63.9)	
Result of exercise - use of pain medication:				
Decreased a lot	6 (10.2)	1 (4.3)	5 (13.9)	
Decreased a little	13 (22.0)	3 (13.0)	10 (27.8)	
Not changed	22 (37.3)	10 (43.5)	12 (33.3)	0.359
Increased a little	3 (5.1)	1 (4.3)	2 (5.6)	
Increased a lot	0	0	0	
Not applicable	15 (25.4)	8 (34.8)	7 (19.4)	
Result of exercise - use of arthritis medications:				
Decreased a lot	2 (3.4)	1 (4.3)	1 (2.8)	
Decreased a little	6 (10.2)	2 (8.7)	4 (11.1)	
Not changed	35 (59.3)	15 (65.2)	20 (55.6)	0.559
Increased a little	4 (6.8)	0	4 (11.1)	
Increased a lot	0	0	0	
Not applicable	12 (20.3)	5 (21.7)	7 (19.4)	
Result of exercise - joint pain:				
Decreased a lot	8 (13.6)	3 (13.0)	5 (13.9)	
Decreased a little	36 (61.0)	11 (47.8)	25 (69.4)	
Not changed	13 (22.0)	9 (39.1)	4 (11.1)	0.061
Increased a little	0	0	2 (5.6)	
Increased a lot	2 (3.4)	0	0	
Not applicable	0	0	0	
Will join another exercise program:				
Yes	43 (72.9)	14 (60.9)	29 (80.6)	
No	3 (5.1)	2 (8.7)	1 (2.8)	0.232
Maybe/not sure	13 (22.0)	7 (30.4)	6 (16.7)	
Will exercise more at home:				
Yes	46 (78.0)	21 (91.3)	25 (69.4)	
No	11 (18.6)	2 (8.7)	9 (25.0)	0.126
Maybe/not sure	2 (3.4)	0	2 (5.6)	

p-value adjusted for multiple comparisons (outcome measures adjusted by using Bonferroni method: 0.05/15): level of sign.: $\alpha = 0.0033$

Table 8: Comparisons of Three Month Post Intervention Questions by Exercise Group (Using χ^2)

Post-Intervention Questions	Both Exercise Groups (n=45) Number (%)	Land Exercise (n=17) Number (%)	Water Exercise (n=28) Number (%)	p-value
Done anything else in past 3 months:				
No	32 (84.2)	11 (84.6)	21 (84.0)	
Physiotherapy	3 (7.9)	0	3 (12.0)	0.115
Naturopath	1 (2.6)	0	1 (4.0)	
Steroid Injections	2 (5.3)	2 (15.4)	0	
Result of exercise:				
Much better now	12 (26.7)	2 (11.8)	10 (35.7)	
Somewhat better now	23 (51.1)	7 (41.2)	16 (57.1)	0.290
About the same	8 (17.8)	6 (35.3)	2 (7.1)	
Somewhat worse now	1 (2.2)	1 (5.9)	0	
Much worse now	1 (2.2)	1 (5.9)	0	
Result of exercise - flexibility:				
Much better now	11 (24.4)	2 (11.8)	9 (32.1)	
Somewhat better now	23 (51.1)	6 (35.3)	17 (60.7)	0.006
About the same	9 (20.0)	7 (41.2)	2 (7.1)	
Somewhat worse now	2 (4.4)	2 (11.8)	0	
Much worse now	0	0	0	
Result of exercise - help from others:				
Decreased a lot	8 (17.8)	1 (5.9)	7 (25.0)	
Decreased a little	8 (17.8)	0	8 (28.6)	
Not changed	15 (33.3)	10 (58.8)	5 (17.9)	0.001*
Increased a little	3 (6.7)	3 (17.6)	0	
Increased a lot	0	0	0	
Not applicable	11 (24.4)	3 (17.6)	8 (28.6)	
Result of exercise - use of walking devices:				
Decreased a lot	3 (6.7)	0	3 (10.7)	
Decreased a little	5 (11.1)	1 (5.9)	4 (14.3)	
Not changed	7 (15.6)	3 (17.6)	4 (14.3)	0.400
Increased a little	1 (2.2)	0	1 (3.6)	
Increased a lot	1 (2.2)	1 (5.9)	0	
Not applicable	28 (62.2)	12 (26.7)	16 (57.1)	
Result of exercise - use of pain medication:				
Decreased a lot	5 (11.1)	0	5 (17.9)	
Decreased a little	13 (28.9)	2 (11.8)	11 (39.3)	
Not changed	17 (37.8)	8 (47.1)	9 (32.1)	0.009
Increased a little	4 (8.9)	4 (23.5)	0	
Increased a lot	0	0	0	
Not applicable	6 (13.3)	3 (17.6)	3 (10.7)	
Result of exercise - use of arthritis medications:	4 (8.9)	0	4 (14.3)	
Decreased a lot	9 (20.0)	2 (11.8)	7 (25.0)	
Decreased a little	22 (48.9)	9 (52.9)	13 (46.4)	0.076
Not changed	3 (6.7)	3 (17.6)	0	
Increased a little	0	0	0	
Increased a lot	7 (15.6)	3 (17.6)	4 (14.3)	
Not applicable				
Result of exercise - joint pain:				
Decreased a lot	6 (13.3)	1 (5.9)	5 (17.9)	
Decreased a little	24 (53.3)	6 (35.3)	18 (64.3)	
Not changed	10 (22.2)	5 (29.4)	5 (17.9)	0.020
Increased a little	4 (8.9)	4 (23.5)	0	
Increased a lot	1 (2.2)	1 (5.9)	0	
Not applicable	0	0	0	
Will join another exercise program:				
Yes	38 (84.4)	11 (64.7)	27 (96.4)	
No	1 (2.2)	0	1 (3.6)	0.003*
Maybe/not sure	6 (13.3)	6 (35.3)	0	
Will exercise more at home:				
Yes	33 (73.3)	12 (70.6)	21 (75.0)	
No	9 (20.0)	4 (23.5)	5 (17.9)	0.894
Maybe/not sure	3 (6.7)	1 (5.9)	2 (7.1)	

p-value adjusted for multiple comparisons (outcome measures adjusted by using Bonferroni method: 0.05/15): level of significance: $\alpha = 0.003$ * significant