The Effects of an Exercise Program for Older Adults with Osteoarthritis of the Hip

ERWIN TAK, PATRICIA STAATS, ARIËTTE VAN HESPEN, and MARIJKE HOPMAN-ROCK

ABSTRACT. ***Objective***. Evaluation of an 8-week exercise program with strength training and lifestyle advice for older adults with osteoarthritis (OA) of the hip. Outcome measures were pain, hip function, disability, quality of life (QOL), and body mass index (BMI).

Methods. Inclusion criteria for this randomized controlled trial were: age ≥ 55 years, clinical diagnosis of OA according to American College of Rheumatology criteria, and living independently. Interview and physical data were collected at baseline, post-test, and followup (3 mo) by trained interviewers and physical therapists with validated instruments: Harris Hip Score, Sickness Impact Profile, Groningen Activity Restriction Scale, functional tests (walking, timed Up & Go, ascending and descending stairs, and toe reaching), and visual analog scales (pain and QOL). Data were analyzed on an intention-to-treat basis. Effect sizes were calculated.

Results. There were 109 participants (55 experimental, 54 controls). The 15 participants who dropped out were characterized by less tolerance to pain and younger age. The program had a positive effect on pain (moderate effect at post-test and small effect at followup), hip function (small effect at post-test), self-reported disability (small effect at followup), and the timed Up & Go test (small effect at followup). It did not affect QOL, other measures of observed disability, or BMI.

Conclusion. The exercise program had positive effects on pain and hip function, which are important mediators of disability. This study fulfilled a need for older adults with hip OA and provides evidence of the benefit of exercise in the management of hip OA. (J Rheumatol 2005;32:1106–13)

Key Indexing Terms:
RANDOMIZED CONTROLLED TRIAL OSTEOARTHRITIS
HIP AGED EXERCISE PROGRAM

Osteoarthritis (OA) is a common locomotor disorder and the most common rheumatic disease. OA is more prevalent in older people. The rapid increase in the percentage of people older than 55 years in Western countries means that OA is becoming a public health problem[1]. The most frequently affected joints are the knee and hip. Symptoms of OA, such as joint pain, tenderness, limitation of movement, crepitus, and variable degrees of local inflammation, are the most reported complaints at general practices. These symptoms often cause difficulties in performing normal daily activities[2,3]. The prevalence of OA of the hip in general practice in The Netherlands is estimated to be 10 to 13 per 1000 patients, with a total incidence of 2.1 per 1000. Based on these figures it was estimated that in 1994 a total of 180,800 patients in general practice suffered from OA of the hip[4]. The total cost of OA is estimated to be about 303 million euro annually, accounting for 0.8% of the total Dutch healthcare budget[5]. About 75% of these costs are made by older adults (65 years and older).

There is no cure for hip OA, and the aim of treatment is to control symptoms with painkillers, physical therapy, and, in severe cases, hip replacement. Disease-related factors, such as impaired muscle function and fitness, are potentially amenable to exercise intervention. Exercise therapy has been recommended as an important conservative treatment for OA[6-8]. Exercise therapy aims at reducing pain and disability by improving muscle strength, joint stability, range of motion, and aerobic fitness. However, there is little evidence for the efficacy of such programs for OA of the hip, in contrast to OA of the knee, and few studies have evaluated the longterm effects of such programs[8].

The most recent systematic reviews[9,10] found only 4 studies that included patients with OA of the hip[11-14]. One review[9] excluded all 4 because they did not meet the study inclusion criteria, and the other included only one study (including 71 patients with hip OA)[13], which obviously limited the ability to draw conclusions about the benefit of exercise therapy for OA of the hip. No studies were found that evaluated exercise programs specifically developed for people with OA of the hip.

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In 1997 a program called "Hop with the Hip" was developed especially for people with OA of the hip. This article describes the results of a randomized controlled trial involving 109 people with clinical symptoms of OA of the hip. We evaluated the short- and longterm effect of this 8-week exercise program on pain, hip function, self-reported and observed disability, quality of life, and body mass index (BMI).

MATERIALS AND METHODS

Participants. Participants were older adults with complaints of OA of the hip. Inclusion criteria were age 55 years and older, clinical diagnosis of OA of the hip, and living independently. People who were on a waiting list for hip replacement (or who had had a hip replacement in the past year) were excluded because an operation could affect their participation in the study and the program was not developed for a presurgery group. Other exclusion criteria were: serious disorders or impairments that jeopardized safe use of fitness equipment, such as neurological or cardiovascular problems, serious depression or dementia (as judged by general practitioners), and regular treatment by a physical therapist (more than once a week). Criteria were checked by means of a screening questionnaire (for details see diagnosis section) completed by all potential participants. The size of the experimental and control group (both 70) was based on a power analysis on the Harris Hip Score[15] (HHS; expected effect 10%, power 80%, alpha 0.05, one-sided testing).

Participants were recruited by means of announcements placed in regional newspapers, health centers, offices of general practitioners, and local television. The 140 people who responded were sent a short questionnaire to check for inclusion criteria. Thirty-one people were excluded: because they did not meet these criteria (n = 25) or withdrew from the study before the start (n = 6). For details see Figure 1. All eligible subjects were asked to give written informed consent. The remaining 109 subjects were randomly assigned (using computer generated randomized numbers) to one of the 2 conditions: 55 subjects to the experimental group receiving the Hop with the Hip program and 54 subjects to the control group receiving no special interventions except their (self-initiated) contact with their own general practitioner.

Participants were tested at baseline, at the end of the program (post-test), and 3 months after the program ended (followup). All 3 assessments consisted of a written questionnaire filled out at home and a physical examination at the research center. The examination was carried out by one of 3 trained physical therapists who were blinded for the condition. The TNO Medical Ethics Committee approved the study.

Diagnosis of OA. Symptoms of OA were deemed present if:

1. The diagnosis of OA of the hip had been made by the general practitioner (checked via questionnaire);
2. Clinical symptoms of OA, evaluated by physical therapists at baseline, met criteria for OA of the hip of the American College of Rheumatology[16], namely, pain in the hip together with endorotation ≥ 15°, pain present at endorotation of the hip, morning stiffness ≤ 60 min after rising, and age > 50 years. Clinical OA was also diagnosed when pain of the hip occurred together with an endorotation < 15° and flexion ≤ 115°.

Measurements. *Background variables.* Information about age, sex, marital status, education, income, occupation, self-reported health, number of chronic conditions, and number of medications was obtained. Body weight and height were recorded during the examination by a physical therapist. BMI was calculated as body mass/height^2 and was used as an outcome variable (according to standard norms, acceptable ratios are in the range 20–25, a ratio of 26–29 considered to reflect overweight, and a ratio > 30 obesity).

Compliance and satisfaction. Participants who followed the program were asked at post-test whether they performed home exercises as intended (expressed as the percentage of people that performed them regularly) and whether they exercised more or less outside the program. Answers were scored on a 3 point scale: 1 = more, 2 = equal, and 3 = less. Participants also judged the program on a scale from 1 to 10, with 1 indicating very bad and 10 excellent.

Pain. Subjects rated tolerance and severity of pain in the past month on a 10-cm visual analog scale (VAS). A higher score indicated more severe pain or more intolerable pain. Pain was also measured with the pain subscale of the HHS[15] by physical therapists who observed patients while performing standardized activities of daily living and a walking pattern. Scores range from 0 to 44, a higher score indicating no pain at all.

Hip function. The HHS, which is treated as the primary outcome measure, consists of 4 variables: pain, functional capacity, range of motion, and deformity. The total score is 100 (patient functions without pain or limitations); a score < 70 reflects moderate/poor functioning[15,17].

Observed disability and activity restrictions. Activity restriction was measured as the time (in seconds) it took to perform 4 functional tasks: 20 m walking with a turn halfway[18], the timed Up & Go test[19], ascending and descending stairs (combined score)[18,20,11], and reaching for toes in a sitting position (combined score of left + right[21]). Toe reaching is measured on a 4-point Likert scale running from 0 to 4, a lower score indicating greater litheness.

Self-reported disability. Self-reported activity restrictions were measured with the Groningen Activity Restriction Scale (GARS), which is a measure of the level of disability while performing 18 daily activities[22]. Scores range from 18 (no problems) to 72 (only with help of others). The Sickness Impact Profile (SIP) is a 136-item self-administered health status questionnaire that is behaviorally based[23]. Two dimensions can be evaluated, psychosocial and physical, of which only the latter is reported here. The scale ranges from 0 to 100, which can be interpreted as the percentage of disability[24].

Quality of life (QOL). QOL was measured in 2 ways: Subjects rated their generic QOL on a 10-cm VAS, which was coded as a score between 0 and 10[25]. A higher score indicates a better QOL. In addition, Health-related QOL (HRQOL) was measured as the sum score for 7 questions (range 7–39) regarding judgment of physical functioning (5-point Likert scale), psychological functioning (5 points), evaluation of own health (5 points), expectation of future functioning (in the next 2 years; 5 points), image of the future (5 points), happiness in last month (7 points), and satisfaction in last month (7 points). A higher score indicates a higher quality of life. The sum scale, which is presented here, shows good validity[26].

Intervention. The content of the intervention program was established in a pilot study[27]. Briefly, using information from the literature, personal interviews with patients and health professionals, and protocols for referral, we determined that pain, hip function, (im)mobility, activities of daily living, eating habits and weight control, and use of assistive devices were important elements to be included in the program. The program was developed in cooperation with a physical therapist, an occupational therapist, and a dietician.

Content. The program Hop with the Hip consists of 8, 1-hour weekly group sessions of strength training using fitness equipment under supervision of a physical therapist. Participants were also offered a home exercise program, personal ergonomic advice (given by an occupational therapist), and dietary advice (given by a dietician). Each training session started with group warm-up exercises, followed by instructions on and individual use of fitness equipment and exercises: leg press, leg raise, rotation in sitting position, leaping squat, pull down, treadmill, home trainer, pulleys, bow flex, and walking. The training session ended with group cool-down exercises. The starting level of each participant was based on the HHS at baseline. All fitness equipment could be used at 2 levels (light and moderate) and was adjusted as the program (and participant) progressed. A home exercise program was developed that included warm-up/cool-down, and specific exercises for the lower extremities. Feedback was given at each group session. The physical therapist informed participants about health-related aspects of OA, exercises, risk factors, etc. Separate education on dietary aspects

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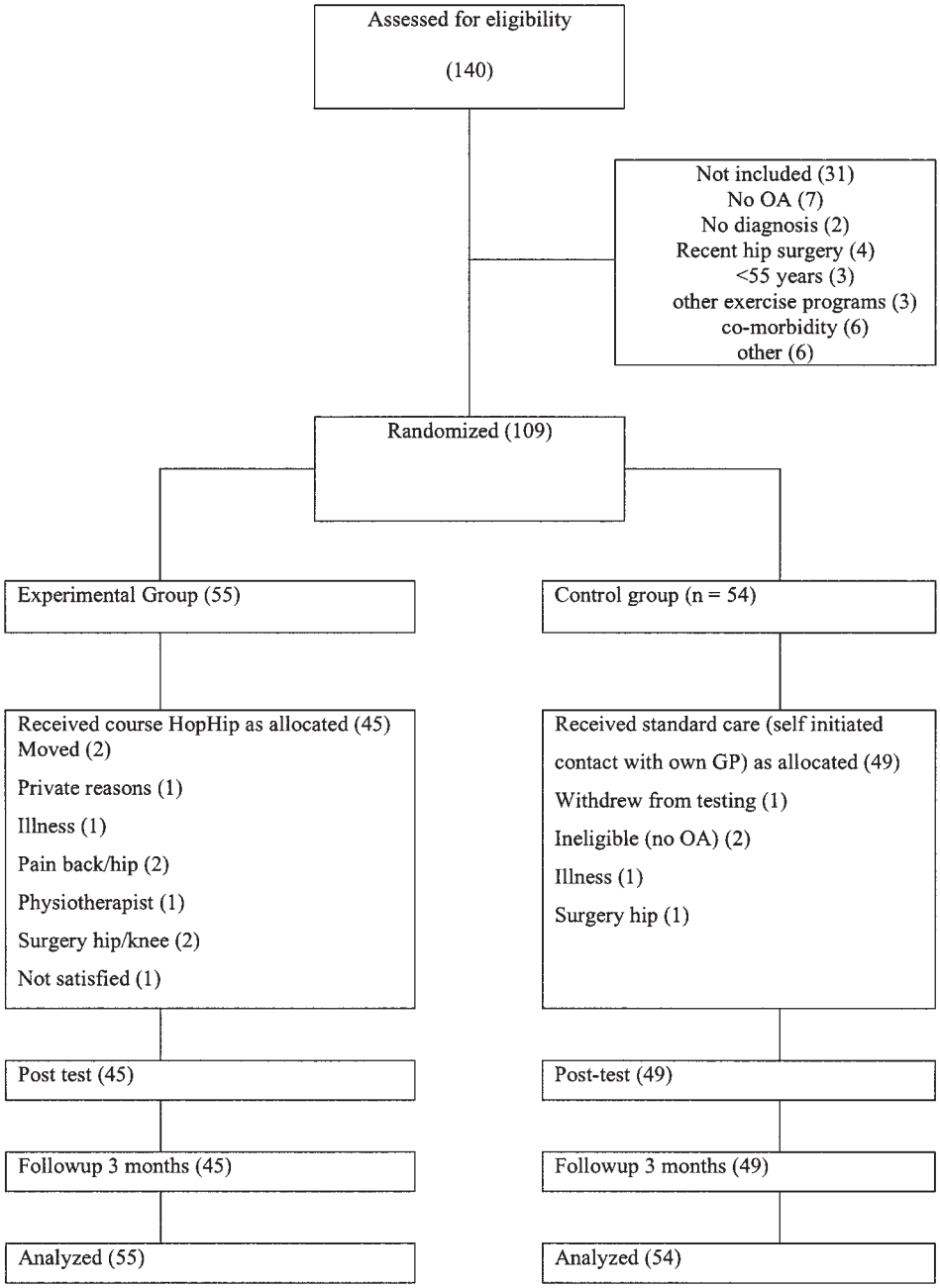

Figure 1. The organization of the study.

(healthy eating and drinking habits) in relation to body mass was given by a dietician. Participants with a BMI > 30 were invited for a personal consultation. All participants could get further information via a special telephone line. An occupational therapist visited all participants at home for individual counseling regarding activity restrictions caused by OA and ways to deal with them.

Statistical analysis. Analyses were performed in SPSS for Windows version 11.5. Repeated measures analysis of variance was used on an intention-to-treat basis to test for significant differences between the experimental group and the control group. The mean scores per group of the 3 measurements (baseline, post-test, and followup) are reported. Contrasts were used to analyze time-group interaction effects for differences between baseline versus post-test and baseline versus followup. An alpha level of 0.05 was used. Because the program was expected to have a significant positive effect in the experimental group, one-sided tests of significance were used. Differences in nominal variables were analyzed with chi-square tests. For comparison of means, t tests were used. Effect sizes for comparisons of baseline versus post-test and baseline versus followup were calculated according to Cohen[28], by dividing the difference of change scores of both groups by the standard deviation of the change scores in both groups together. A score of 0.2 is regarded as a small effect, 0.5 as a moderate effect, and 0.8 and higher as a large effect[28].

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RESULTS

Fifteen people dropped out of the study: 5 in the control group and 10 in the experimental group. The main reasons for dropping out were not related to aspects of the study, intervention, or symptoms of OA. One participant of the program withdrew because she thought the content was too simple, 2 others complained of pain in the back and hip, and one started treatment with a physical therapist (for further details see Figure 1).

The characteristics at baseline of the experimental, control, and dropout group participants are shown in Table 1. There was no difference between control and experimental groups regarding these characteristics. Dropouts were younger and reported less tolerance to pain, although they did not have more pain. The remaining subjects (n = 94) had a mean age of 68 years and were predominantly female. Most subjects were married, had completed secondary education, and were slightly overweight. More than half considered their general health to be good or excellent.

The level of program compliance was high, with 77% performing the home exercises as intended. In the experimental group twice as many participants indicated at post-test that they also had been doing more exercise outside the program (chi-square = 5,0; df = 2; $p < 0.05$). The program in total had an average score of 8 on a scale of 1 to 10, indicating that the program satisfied participants.

Outcome variable. Table 2 presents all results for outcome variables of the intention-to-treat analysis. No statistically significant differences between experimental and control groups were found at baseline (t test). The number of participants included in the separate analyses was different because of different levels of response to the different measurements. Numbers were low for the GARS, mainly due to the way the instrument deals with missing values on individual questions.

Pain. In the experimental group, pain had decreased slightly at both the post-test and followup assessments, whereas in the control group pain was diminished only at the post-test assessment (not significantly different between both groups) and was even much higher at the followup assessment. The difference in change in pain was significant ($p < 0.05$). This improvement in pain in the experimental group was not only subjective but also objective, as measured with the pain scale of the HHS at both post-test ($p < 0.01$) and followup ($p < 0.05$).

Hip function. The total score of the HHS increased significantly in the experimental group at post-test ($p < 0.05$) but had diminished at the followup assessment. There was no statistically significant effect (however, a trend was visible, $p < 0.10$).

Disability. On all 3 measurements, the experimental group

Table 1. Baseline characteristics of the experimental group, control group, and dropouts with a diagnosis of OA of the hip.

	Experimental, n = 45	Control, n = 49	Dropouts, n = 15
Sex			
Male, n (%)	16 (36)	14 (29)	4 (27)
Female, n (%)	29 (64)	35 (71)	11 (73)
Age, yrs, mean (SD)	67.4 (7.6)	68.9	64.9 (6.4)*
Marital status, n (%)			
Married	27 (60)	27 (55)	10 (67)
Living together	1 (2)	2 (4)	1 (7)
Divorced	3 (7)	4 (8)	2 (13)
Widowed	7 (16)	6 (12)	2 (13)
Living alone	6 (13)	8 (16)	—
Education, n (%)			
Primary	9 (20)	10 (20)	2 (13)
Secondary	28 (62)	21 (43)	9 (66)
College/university	7 (16)	8 (16)	2 (13)
Body mass index, mean (SD)	26.4 (3.0)	26.6 (4.3)	26.1 (4.5)
General health, n (%)			
Moderate/bad	18 (40)	22 (45)	5 (33)
Good/very good	27 (60)	26 (53)	10 (67)
No. of chronic conditions, mean (SD)	2.6 (1.8)	2.7 (1.9)	2.8 (1.5)
No. of medications	1.6 (1.8)	1.7 (1.4)	1.7 (1.8)
Pain, mean (SD)			
Bearable†	4.2 (5.2)	4.1 (3.7)	6.7 (5.6)*
Quantity‡	3.8 (2.3)	4.4 (2.2)	4.8 (3.1)

† 0 = bearable, 10 = unbearable; ‡ 0 = no pain, 10 = very severe pain. * Statistically significant difference, $p < 0.05$.

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Table 2. Results on the outcome variables of Group × Time interaction effects: pain, hip function, observed and self-reported disability, quality of life, and BMI. Values are mean ± SD.

Outcome Measure	N	Baseline	Post-test	Followup	Baseline vs Post-test F statistic	Baseline vs Post-test p (1-sided)	Baseline vs Followup F statistic	Baseline vs Followup p (1-sided)
Pain								
Subjective (VAS)								
Experimental	35	3.8 (2.1)	3.6 (2.5)	3.5 (2.1)				
Control	39	4.2 (2.2)	4.1 (2.1)	5.1 (2.3)	0.09	0.385	4.49	0.019
Observed (HHS pain scale)								
Experimental	39	27.9 (8.1)	31.0 (8.6)	29.6 (10.4)				
Control	44	28.8 (9.0)	26.5 (8.7)	26.9 (9.8)	6.39	0.007	2.86	0.047
Hip function								
Harris Hip Score								
Experimental	39	71.1 (12.9)	77.0 (11.6)	75.4 (14.6)				
Control	44	71.0 (13.3)	71.2 (13.2)	71.1 (15.1)	3.61	0.031	2.01	0.081
Observed disability								
Walking 20 m (in seconds)								
Experimental	39	19.8 (4.4)	19.8 (4.3)	19.4 (5.1)				
Control	44	20.6 (4.8)	20.8 (5.0)	21.1 (5.8)	0.27	0.302	1.43	0.079
Stairs (up + down in seconds)								
Experimental	39	17.4 (8.9)	17.1 (7.4)	16.9 (6.3)				
Control	42	18.5 (7.0)	18.1 (6.6)	18.8 (6.1)	0.01	0.465	0.75	0.195
Timed Up & Go (in seconds)								
Experimental	39	10.4 (3.4)	10.1 (2.8)	9.4 (3.2)				
Control	44	10.5 (2.6)	10.4 (3.5)	10.6 (3.6)	0.18	0.333	3.04	0.043
Toe reaching (left + right)								
Experimental	38	2.07 (1.16)	1.99 (1.10)	2.04 (1.15)				
Control	42	2.10 (1.91)	2.10 (1.14)	2.27 (1.22)	0.20	0.328	1.46	0.116
Self-reported disability								
GARS								
Experimental	23	22.8 (5.4)	22.5 (5.0)	23.7 (5.4)				
Control	25	25.3 (5.7)	25.5 (6.2)	26.3 (6.3)	0.37	0.274	0.18	0.447
SIP Physical								
Experimental	39	7.2 (9.2)	5.7 (7.2)	5.1 (4.7)				
Control	41	7.6 (8.3)	7.5 (8.1)	8.4 (8.4)	2.15	0.074	3.12	0.041
Quality of life								
Generic quality of life (VAS)								
Experimental	36	7.0 (4.3)	5.9 (2.0)	5.0 (1.4)				
Control	39	5.6 (2.3)	5.5 (2.3)	4.2 (1.5)	1.44	0.117	0.69	0.204
Health related quality of life								
Experimental	35	28.2 (3.1)	28.1 (5.6)	28.6 (3.6)				
Control	38	27.3 (2.4)	26.5 (5.6)	27.3 (2.7)	0.35	0.279	0.04	0.262
BMI								
Experimental	39	26.1 (2.8)	26.2 (2.8)	27.3 (2.8)				
Control	44	26.8 (4.3)	26.7 (4.2)	28.1 (4.6)	0.46	0.249	0.59	0.222

HHS: Harris Hip Score, BMI: body mass index.

showed a lower level of restrictions on self-reported disability, measured with the GARS questionnaire (although not statistically significant). On the physical subscale of the SIP, there was a significant difference ($p < 0.05$) at followup, indicating an improvement in the experimental group. At post-test assessment, there was only a trend to improvement ($p < 0.10$). Disability measured with 4 functional tasks (walking, timed Up & Go, ascending stairs, and toe reaching) was not significantly different in the 2 groups, with the exception of a significantly better timed Up & Go performance at followup ($p < 0.05$) in the exercise group and a tendency to an improvement in walking speed. As can be seen from Table 2, the experimental group seemed to show a slight (nonsignificant) improvement on some other tasks, whereas the control group showed a marginal decline or stabilization.

Quality of life. Quality of life (VAS and sum score) remained stable in both groups throughout the study.

Overweight. The BMI remained fairly stable during the program but had increased in both groups by the followup assessment.

Table 3 gives an overview of the effect sizes that were calculated according to Cohen. At post-test, a moderate effect was found on the pain scale of the HHS, and small

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Table 3. Effect sizes* outcome measures baseline versus post-test and baseline versus followup.

Outcome Measure	Baseline vs Post-test	Baseline vs Followup
Pain (VAS)	0.00	0.17
Pain scale HHS	0.51	0.38
Harris Hip Score	0.41	0.34
Walking 20 m	0.15	0.22
Stairs	0.00	0.13
Timed Up & Go	0.10	0.35
Toe reaching	0.05	0.14
GARS	0.04	0.02
SIP Physical	0.31	0.29
Generic QOL	0.25	0.23
Health Related QOL	0.14	0.07
BMI	0.15	0.15

* Small effect > 0.2; moderate effect > 0.5; large effect > 0.8[28]. GARS: Groningen Activity Restriction Scale; HHS: Harris Hip Score; SIP: Sickness Impact Profile.

effects were found for the total score of the HHS and SIP physical and generic QOL, as measured with a VAS scale. At followup, small effects were again found for the pain subscale and total score of the HHS, and for the timed Up & Go and walking test. The effects for all functional tests increased between the post-test and followup assessments, whereas the HHS scores decreased slightly. The small effects for both SIP and generic QOL were maintained at followup.

DISCUSSION

Our study evaluated the effect of an exercise program for older adults with OA of the hip that consisted of (guided) physical exercise and specialized (and in some cases individualized) OA-focused health education. The program diminished pain and improved general hip function and self-reported disability. One of the measures of observed disability showed slight improvement at followup, while 3 other measures as well as QOL and BMI were not affected.

Although OA of the hip is a common disease, there have been few specific intervention studies. In their systematic review[13], which included only one study of OA of the hip (in combination with OA of the knee), Van Baar, *et al*[10] concluded there was sufficient evidence of a beneficial effect of exercise therapy on OA of the hip. Small short-term effects were mainly found on pain and self-reported disability. Our results are in agreement with these effects. Fransen, *et al* decided not to draw conclusions at all because of the limited number of studies concerning hip OA[9]. Two recent studies of the longterm effect of exercise therapy on OA of the hip have been published[29,30]. Van Baar, *et al*[29] reported the 12- and 24-week followup data of a previous study[13] on exercise therapy for patients with OA of the hip and/or knee. They found the effects of the intervention diminished after 12 weeks and almost completely disappeared after 24 weeks. In their interventional study without a control group, Weigl, *et al*[30] investigated patients with OA of the hip and/or knee who had been referred to an inpatient rehabilitation center, where they received a 3- to 4-week intervention consisting of exercises, flexibility and endurance training, and consultation for preventive measures. Both pain and functional disability improved at the end of the intervention, but these effects had almost disappeared after 12 months. We found stable effects of the training program on pain and hip function, although the effect diminished slightly 12 weeks after completion of the program. In contrast, disability seemed to improve after 12 weeks. These results seem to resemble those of Van Baar, *et al*[29] at 12 weeks. Unfortunately we do not have data for a longer period.

Hop with the Hip is one of a few programs specifically designed for hip OA. Most programs combine people with knee and hip OA, although these conditions do not always seem to be compatible. A previous program developed for OA of the hip and knee[14] proved less beneficial to patients with OA of the hip than to patients with OA of the knee. In a recent study that specifically evaluated patients with OA of the hip, individual manual therapy was found to be superior to individual exercise therapy, with an 80% improvement in general well-being as the primary outcome[31]. Also pain, hip function, and range of motion improved significantly more in the manual therapy group. Further research will be needed to explore this kind of (individual) therapy, but these preliminary results show promise for older adults.

Of the outcome variables, pain showed the most stable effect. Given that pain is an important mediating factor of physical and social restrictions[32,33], this is an important outcome that makes exercise therapy important in pain control. Other research indicated that exercise can be an important mediator for reducing pain levels[34]. It should be kept in mind that in OA, pain severity fluctuates and is often not very severe, which makes it difficult to find large effects on pain.

On a functional level the HHS showed a small significant effect at post-test, which diminished at followup. This possibly can be related to a relapse in exercising during the period between post-test and followup, but we do not have data to confirm this.

There were also mixed results between the different outcome measures and measurements for disabilities. This warrants some caution in interpreting the effect of the intervention, although some of these differences can be explained. For the self-reported disabilities, these mixed results could be due to the differences between both questionnaires. For instance the GARS questionnaire suffered from a relatively low number of cases in the analysis due to the way it deals with missing values, which is not the case for the SIP. Several reasons can be given for the relatively small effects that were found. First, participants had a relatively high

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level of performance at the start of the study (they showed moderate limitations and restrictions, and fairly good hip function), which raises the possibility of a ceiling effect. That most of the evaluated activities were not trained for specifically (with the exception of walking) also limits possible effects. It could be expected that if pain, hip function, and exercise level stay improved, these functional capacities will show an effect in the future[35]. This already can be seen at followup, 12 weeks after the end of the intervention, where effect sizes for the functional tests had increased. Finally, the level of training intensity was kept moderate (1 hour per week) so that participants could exercise without pain and limitations. Increasing the intensity or extending the duration of the training program also could enhance effects on the functional level. Exercising on a regular basis could reduce or prevent further limitations. Participants who completed the training program also exercised more often outside the program. Additionally, 77% of the participants indicated that they performed the home exercises regularly.

We did not find an effect on the QOL, possibly because we used a generic (health-related) QOL measure instead of a questionnaire, addressing the specific problems of OA that were dealt with in the program. The combination of exercise and dietary information did not lead to weight reduction in the experimental group. Indeed, all participants gained weight after the program ended, so it seems that factors outside the program accounted for this effect. In contrast to OA of the knee, there is only moderate evidence that overweight is a risk factor for the development or aggravation of OA of the hip[36,37]. It may be that extra attention and information are needed to achieve weight reduction. In the current program only a part of one session was devoted to dietary concerns and only people with BMI > 30 received additional individual information. It could be argued that the group with BMI > 25 would also benefit from this kind of individual approach.

The main limitation of our study was that we did not meet the target of 140 included patients at the start of the study, which affected its statistical power. This could have affected small differences, which would not reach the level of statistical significance. This was probably the case for the total score on the HHS at followup and SIP Physical, which showed a statistical trend at post-test. We recruited participants in several ways but always stated the criteria for study participation. The fact that many people responded who did not meet these criteria suggests that there is a (broad) need for this type of program. One way to increase recruitment of participants could be through general practitioners. Although we approached several practices, only 10 general practitioners were willing to participate (mostly because of lack of time). Another option would have been to use patients on a waiting list for (hip) surgery, but this would mean a different population with more serious symptoms. Our group had an average score on the HHS of 71 ± 13, while patients on a waiting list have a much lower score (57 ± 17)[17]. Fifteen participants dropped out during the study for reasons that were mostly not related to the program. It seems that dropouts evaluated their pain as less tolerable, which could have been a reason for dropping out.

On a statistical level, the number of tests that were carried out (22 in total) to evaluate the effects of the program on the outcome measures should warrant caution when interpreting the results. Carrying out this number of tests increases the chance of finding a significant result, although this study was hypothesis-driven.

At the same time as Hop with the Hip, a separate self-management program for OA of the knee and hip, "Coping with OA," was developed and evaluated; the program has a broader scope and relies more on behavioral and self-management aspects. It has a positive effect on pain, quality of life, knowledge, self-efficacy, lifestyle, and healthcare use[14]. Both programs have since been adapted and evaluated in a pilot implementation study in The Netherlands, which yielded results similar to those obtained in a research setting[38]. Minor changes were made to the hip program: separate dietician's advice was omitted (integrated into group health education by the physical therapist); an additional session for general advice and instruction was added; and availability of additional information by telephone was omitted.

Participants of Hop with the Hip awarded the program a score of 8 on a satisfaction scale of 1 to 10. Clearly, it filled a need and lived up to expectations in this group. With a growing population of people with OA in the future and rising costs and pressure on the healthcare system, this type of program is a ready alternative to prevent or reduce the negative effects of OA.

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