Adherence and Satisfaction of Rheumatoid Arthritis Patients With a Long-Term Intensive Dynamic Exercise Program (RAPIT Program)

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Objective. To evaluate adherence and satisfaction of patients with rheumatoid arthritis (RA) in a long-term intensive dynamic exercise program.

Methods. A total of 146 RA patients started an intensive (strength and endurance training for 75 minutes, twice a week, for 2 years) exercise program (Rheumatoid Arthritis Patients In Training) aimed at improving physical fitness. Program attendance and satisfaction were examined. Additional assessments at baseline were done to find possible predictors of attendance.

Results. Median (interquartile range) age and disease duration of the patients were 54 (45–61) and 5 (3–10) years, respectively. After 2 years, 118 (81%) patients still participated in an exercise class. The median attendance rate of all patients was 74%. Low attendance was weakly associated with high disease activity, low functional ability, and low quality of life at baseline but not with the severity of joint damage at baseline. At the end, 78% of all participants would (strongly) recommend the program to other RA patients.

Conclusion. Adherence and satisfaction of RA patients with an intensive dynamic exercise program over a prolonged time can be high. Disease severity parameters do not strongly predict the compliance of participants in an intensive exercise program.

INTRODUCTION

Several studies have shown that patients with rheumatoid arthritis (RA) have decreased muscle strength, muscle endurance, joint mobility, and cardiovascular fitness in comparison with healthy age-matched controls (1–5). To counteract the negative consequences of decreased physical fitness, RA patients are advised to participate in intensive dynamic exercise programs (6). The feasibility, efficacy, and safety of short-lived, intensive dynamic exercise programs lasting at most 1 year have been supported in a number of studies (7,8). However, the effects of exercise disappear soon after finishing an exercise program (9). Therefore, to maintain physical fitness, patients need to participate in exercise programs over a prolonged period. Before long-term intensive exercise programs can be implemented as a structured part of daily care for patients with RA, more information about the feasibility of such exercise programs is needed. Are RA patients able and willing to adhere to an intensive dynamic exercise program over a prolonged period? Adherence of arthritis patients with short-term supervised exercise programs (<12 months) is reported as high, with adherence rates ranging from 68% to 93% (10). In comparison, adherence rates to medical regimens range from 16% to 84% (11). Reported determinants of adherence to short-term exercise regimens in patients with RA are self efficacy, previous exercise habits, attitude towards the exercise program, and (perceived) severity of the disease (12–16). Data regarding adherence or determinants of adherence to long-term exercise programs in RA are sparse. The same applies to the satisfaction of patients with a long-term intensive exercise program. Insight into adherence, determinants of adherence, and satisfaction with a long-term intensive exercise program in RA is necessary for implementation of these programs (17). The aims of this study are therefore 1) to examine RA patients' adherence to a long-term supervised exercise program with intensive dynamic weightbearing aerobic and muscle-strengthening exercises (Rheumatoid Arthritis Patients In Training [RAPIT]), 2) to investigate if known determinants of short-term adherence predict adherence to the RAPIT program, and 3) to describe the long-term satisfaction of RA patients with the RAPIT program.

PATIENTS AND METHODS

Design.

The feasibility study was part of the RAPIT trial, a randomized, controlled multicenter trial in which the feasibility, effectiveness, and safety of a long-term intensive dynamic exercise program (RAPIT program) were investigated in patients with RA. This trial was carried out in the outpatient clinics of 3 hospitals in the Netherlands (Leyenburg Hospital, The Hague; Jan van Breemen Instituut/ University Medical Centre Vrije Universiteit, Amsterdam; and University Medical Centre, Leiden) from June 1998 until June 2000. The medical ethics committees of all participating hospitals approved the RAPIT trial and all patients gave written informed consent.

Patients.

All RA patients registered in the outpatient clinics were invited to participate in the RAPIT trial. The following inclusion criteria were used: 1) RA according to the 1987 revised American College of Rheumatology (ACR, formerly American Rheumatism Association) criteria (18), 2) age between 20 and 70 years; 3) stable dosage of diseasemodifying drugs in the last 3 months; 4) functional class I, II, or III according to the 1991 ACR revised criteria for classification of functional status (19), 5) able to cycle on a home trainer, and 6) living a maximum distance of 10 km from the training and research centers. Exclusion criteria were 1) inability to tolerate physical fitness training due to the presence of serious cardiac or lung disease and 2) the presence of 1 or more prostheses of weight bearing joints (ankle, knee, or hip). Eventually, 300 patients were included in the study and randomly allocated to either the intensive exercise group (n = 150) or the control group (n = 150). Patients assigned to the control group received conventional physical therapy only if referred by their medical attendant. The results regarding the outcome in the intensive exercise group as compared with the control group will be published elsewhere. In the present study, we consider only data of the patients allocated to the intensive exercise group.

Exercise program.

Patients randomized to the intensive exercise group were encouraged to participate in group exercise sessions of 75 minutes each, twice weekly. Exercise classes were organized in 5 fitness or sport rooms in 3 cities and were free of charge. In the Dutch health care system, patients usually have to pay at least a part of the costs of group exercise therapy. Some health insurance companies remunerate all costs of participating in an exercise class. In each city, one exercise group was scheduled in the evening to allow patients with a job to participate.

The exercise program was given in 11 exercise classes with 10–15 patients. Patients themselves were free to choose an exercise class, so classes were not assembled on basis of initial fitness level or age. Each class was supervised by 2 physical therapists. If the number of participants in an exercise class decreased to 7–10 patients, the class was supervised by one physical therapist. The exercise program was aimed at increasing and maintaining cardiovascular fitness, muscle fitness (strength and endurance), and joint flexibility with the ultimate aim of improving the performance of daily activities.

The intensity of the exercise program was based on recommendations published by the American College of Sports Medicine concerning the quantity and quality of exercise for developing and maintaining cardiovascular and muscular fitness and flexibility in healthy adults (20). The exercise program is described in more detail in Appendix A. The median (range) resistance on the bicycle ergometer increased from 45 (20–135) watts in the first week to 75 (25–245) watts after 24 weeks. The median (range) heart rate, expressed as a percentage of predicted maximal heart rate (220 – age) and measured at the end of each bicycle training session, increased from 70% (47–91) to 81% (53–107) between weeks 1 and 24. After 24 weeks, there was no additional increase in bicycle resistance or heart rate.

Evaluation of adherence.

To evaluate adherence, attendance to the exercise sessions over 2 years was recorded. Dependent on the exercise class, the maximum possible number of sessions in which the patient could participate was 182–192 (mean 187). The adherence rate was calculated by taking the number of attended sessions as a percentage of the total number of sessions that could be attended in the patients' exercise class.

Evaluation of pain during or after exercise sessions.

After 2 years, patients were asked whether they had experienced episodes of increased pain during or directly after exercise sessions. Patients were asked how often (never, sometimes, regularly, often, or always) they had experienced these episodes of aggravated pain.

Satisfaction with the program.

After 1 and 2 years, the satisfaction of the participants with the exercise program was examined by means of a questionnaire. The questionnaire consisted of 3 parts: the quality of care as perceived by the participants, the satisfaction of participants with exercise program parameters, and the overall satisfaction of participants. To examine the perceived quality of care, patients were asked to rate both the importance of several aspects of the exercise program as well as the quality of the program according to the method developed by Sixma et al (21). Importance was rated on a Likert scale with response categories unimportant (0), on the whole important (1), important (2), and extremely important (3). Perceived level of performance on these categories was rated with the following response categories: not good (–2), not really good (–1), on the whole good (1), good (2). In total, 16 aspects of the exercise program were examined. The quality of each aspect of the exercise program was calculated as the product of importance and perceived performance, resulting in a score with a range from –6 (extremely important and perceived as not good) to 6 (extremely important and perceived as good). An example will be given to clarify the method used: patients were asked to rate the importance of "Instructors of an exercise group must have sufficient knowledge about rheumatoid arthritis" (= importance score) and to rate their perceived experience with this aspect in their own exercise class (= performance score). If the patient rated this issue as important (= 2) and had the opinion that his own instructor performed good (= 2) with respect to this item, the quality score for this patient and this aspect would be 4.

An overall patient perceived quality score was calculated by summation of all item scores. To allow comparison with other satisfaction studies, the overall patient perceived quality score was transformed to a score ranging from 0 (low quality) to 1 (high quality).

To examine the satisfaction of participants with specific parameters of the RAPIT program, participants were asked if the duration, frequency, and intensity of exercise sessions and the number of patients within exercise classes were satisfactory or should be changed.

Finally as an indication of overall satisfaction of participants, 2 questions were asked. The first question related to the willingness of participants to recommend the program to other RA patients. The following phrase was used: Imagine a friend who also has RA with similar complaints as you. Would you recommend the exercise program to your friend? The answer categories varied from "No I would strongly dissuade it" to "Yes I would strongly recommend it." The second question concerned patient's willingness to continue participation in an intensive dynamic exercise program after 2 years of participation in the RAPIT exercise program.

Attitude towards an intensive exercise program.

To examine the attitudes of participants toward intensive exercise (exercise beliefs), a self-developed questionnaire was sent to all eligible patients 3 months before the start of the study. It consisted of 4 statements concerning positive and negative outcome expectations of intensive exercise, e.g., "I think that regular intensive exercise will damage my joints." These 4 statements could be answered on a Likert scale with 1 of the following categories: fully disagree (–2), disagree (–1), agree (1), and fully agree (2); they were then summarized in a total expectation score, ranging from –2 (very negative expectations) to +2 (very positive expectations). The questionnaire also contained a statement and a question about self efficacy toward intensive exercise, resulting in a self-efficacy score ranging from –4 (low self efficacy) to +4 (high self efficacy) for the intensive exercise program. Previous exercise habits were asked by the question "How active were you before you were diagnosed with RA in comparison with persons of the same age?" This question could be answered on a 5 point Likert scale ranging from "far less active" to "far more active."

Additional assessments.

Before starting the exercise program, demographic characteristics (age, sex, disease duration, work status) of all participants were obtained. Additional assessments of disease severity at baseline included functional ability, quality of life, disease activity, pain, and joint damage. Every 3 months, measures of disease activity were repeated.

Functional ability was measured with the Health Assessment Questionnaire (HAQ) (22).

Quality of life was measured with the Rheumatoid Arthritis Quality of Life (RAQoL) questionnaire (23). The RAQoL consists of 30 yes/no questions and has a range from 0 to 30, lower score indicating higher quality of life.

Disease activity was measured by the Disease Activity Score based on 4 variables (DAS4) (24); the Ritchie Articular Index, 44 swollen joint count, erythrocyte sedimentation rate, and a visual analog scale (VAS) for general health. Mean disease activity during the whole training period was calculated by averaging all 3 monthly DAS4 scores (n = 8) obtained during the training period.

Pain was measured at baseline and every 3 months thereafter with a VAS examining the pain experienced by the participants in the week before the assessment. This VAS examined general pain and was not directed toward experiences of pain during or directly after the exercise session.

Joint damage was measured with radiography. Radiographs of ankles, knees, hips, elbows, and shoulders (large joints) and of hands and feet (small joints) were taken at study entry and after 1 and 2 years. The damage to the joints was evaluated according to the Larsen classification (25).

RESULTS

Adherence.

The exercise group of the RAPIT study included 150 patients. The median (interquartile range [IQR]) age and disease duration of the patients at enrollment was 54 (45–61) and 5 (3–10) years,

respectively. Because all patients were included at once, there was a delay of about 2 months between inclusion and the start of the exercise program. Four patients entered the study but did not start the program because of personal circumstances, so eventually 146 patients started the exercise program. After 2 years, 118 (81%) patients were still participating in an exercise class (completers). Twenty-eight patients ended the exercise program early (noncompleters). Of the noncompleters, 9 participants stopped the exercise program because of severe comorbidity (4 with cancer, 1 with myocardial infarction, 1 with pulmonary embolism, 2 with psychiatric disorder, and 1 with abdominal surgery). The reasons for declining participating of the remaining noncompleters were not clear or were unknown. Patient characteristics of completers and noncompleters are presented in Table 1. Noncompleters tended to have higher joint damage scores and HAQ scores at baseline, but differences with completers did not reach statistical significance. The median (IQR) attendance rate of all patients started was 74% (55–82%). Averaged over 2 years, 30% of all participants had a sufficient (50–75%) and 49% a high (75–100%) attendance rate. The percentage of participants with a high attendance rate was 65% in the first half year, decreased to 49% in the second half year, and remained almost stable (38% and 43% in third and fourth half year) thereafter.

[TABLE 1]

Association of adherence with sociodemographic and disease parameters.
   The association of several sociodemographic and disease parameters with the attendance rate is presented in Table 2. With respect to baseline variables, low age and low health status as measured with the DAS4, HAQ, and RAQoL were significantly associated with a low attendance rate. No relation was found between the attendance rate and joint damage in large or small joints. With respect to variables measured during and after the exercise period, low attendance rate was significantly associated with a high mean disease activity, a high mean pain score, and a high frequency of pain episodes related to exercise sessions. Lowered adherence rates during the second year as compared with the first year were, however, not related to increased disease activity (data not presented).

[TABLE 2]

Pain during or after exercise sessions.
   Most patients experienced pain "sometimes" (65%) or "never" (16%). Pain episodes after exercise sessions were "regular" in 11% and "often" in 7% of participants. Pain was most frequently experienced in the hand or wrist (62%), knee (55%), shoulder (45%), feet or ankle (43%), hip (27%), elbow (21%), and back or neck (11%). About half of the participants said that aggravated pain was relieved directly afterward (24%) or within 4 hours (21%).

Satisfaction.
   After 1 year, 130 patients and after 2 years, 126 patients returned the satisfaction questionnaire. At least 1 of the 2 questionnaires was returned by 97% (114 of 118) of all completers, 0% (0 of 9) of noncompleters with severe comorbidity, and 84% (16 of 19) of the other noncompleters. The results regarding patients' perceived quality of the exercise program are presented in Table 3. Patients rated the most important aspect of an exercise program as "instructors must have sufficient knowledge about rheumatoid arthritis." The percentage of patients satisfied with the respective aspects of the program was high, ranging from 76% to 98% of all patients. The median (IQR) total patient perceived quality scores for first and second year were 0.72 (0.65– 0.79) and 0.74 (0.66–0.88), respectively. Participants' satisfaction with the parameters of the RAPIT exercise program are presented in Table 4. Most patients were satisfied with the program parameters. However, the number of participants satisfied with the frequency of exercises sessions decreased from 70% in the first year to 45% in the second year. After 2 years, half of the patients preferred a frequency of once a week above twice a week. The answers on the questions indicating overall satisfaction showed that 78% of the 146 patients who started participation would recommend or strongly recommend participating in a high

intensity exercise class to other RA patients. Moreover, 73% answered that they would like to continue the exercises after 2 years.

[TABLE 3-4]

DISCUSSION

The results of this study support that the large majority of all patients who were included in an intensive dynamic exercise group of a randomized study were still participating in exercise classes after 2 years, with both high compliance and satisfaction. Low adherence was weakly associated with high disease activity at baseline and during the training phase; it was weakly associated with low age, low functional ability, and low quality of life at baseline; it was not associated with joint damage. In spite of the fact that half of the participants preferred an exercise session frequency of once instead of twice a week, and more than half of the patients had experienced pain at least sometimes during or direct after an exercise session, the majority of all participants would (strongly) recommend other RA patients participate in an exercise program like the RAPIT exercise program.

The conclusions with respect to satisfaction and frequency of pain episodes have to be taken with some restraint. Both satisfaction and the frequency of pain episodes were asked retrospectively, probably introducing bias to favorable results. It is known that satisfaction questionnaires frequently overestimate actual satisfaction. This bias may have been limited by using the method developed by Sixma et al (21), in which the expected overestimation is taken into account. That satisfaction was not biased but truly high is suggested by the high adherence found in our study. Patients with limited satisfaction would not complete a time-consuming intensive intervention like an exercise program. Patients' satisfaction was in accordance with the mean satisfaction score found in a metaanalysis of 221 satisfaction studies concerning several kinds of interventions (26).

One may ask if the generalizability of the conclusions is limited due to the fact that adherence and satisfaction were studied within a trial setting. It is conceivable that more emphasis is taken by investigators to please participants, thus enhancing adherence and satisfaction. Furthermore, because of the requested effort, the participants would not be representative of all RA patients fulfilling the inclusion criteria. To examine the comparability of participants with other RA patients, a comparison was made between those who did not want to participate and those who participated in the study (27). This comparison revealed that participants had indeed a significantly more positive attitude towards intensive exercise programs and a significantly higher self efficacy for this kind of exercise. There were, however, no large differences in sociodemographic and disease severity variables. Therefore, the conclusions can be generalized to all RA patients fulfilling the inclusion criteria and with comparable positive motivation towards intensive exercise programs.

The results concerning adherence are comparable with adherence to short-term programs (6), but are higher in comparison with adherence to long-term programs. Hansen et al (28) found that only half of the patients who started with a 2-year exercise program attended at least 50% of the once weekly sessions, and Stenström et al (15) reported that 37% of patients did not complete a 1-year exercise program. We hypothesize that several aspects of the RAPIT exercise program could have contributed to the high adherence. First, exercise was given in exercise classes enhancing social support (29). Second, the exercise program consisted of meaningful activities like running, stair climbing, and throwing and was changed every 8 weeks. Furthermore, contact between participants was stimulated by the opportunity to have a social drink after each session. Moreover, patients were called at home if they repeatedly did not come to the session.

In contrast with other studies, no strong predictors of adherence could be found. The absence of an association between adherence and self efficacy, previous exercise habits, and exercise beliefs is probably caused by the a aforementioned selection of participants with a positive motivation. Because all participants were found to have high self efficacy and exercise beliefs levels, variability in the scores of these variables was low. The conclusion that participant characteristics are not good predictors of compliance is not in contrast, however, with previous findings (30,31). Robison and Rogers (31) concluded in their extensive review that "despite nearly 10 years of study in this area, it still is not possible to predict with consistency who will adhere to exercise programs." In this study, we have focused mainly on the association between disease characteristics and the adherence to

intensive exercise programs. It may be possible that other aspects, not investigated in this study, will have influenced the adherence to the exercise program, such as personal circumstances, distance to the training place, or transportation.

Patients rated the knowledge and attention of instructors as most important aspects of an exercise program. We would like to emphasize, therefore, that adequate supervision has to be an important issue in organizing an exercise programs for patients with RA.

This study provides insight into the willingness and ability of patients with RA to participate in a long-term intensive exercise program. Despite the fact that the results are very positive, one has to consider that high adherence and high satisfaction are not evidence for sufficient efficacy and safety of long-term intensive exercise programs. Efficacy and safety as well as cost effectiveness have to be examined by comparison of patients allocated to the intensive exercise group and patients allocated to usual care. The results of these comparisons will be published elsewhere; however, preliminary results seem to be promising (6,32).

In our opinion, the time is ripe for preparing widespread implementation of intensive exercise programs for patients with RA.

ACKNOWLEDGMENTS

TABLES

Table 1. Patient characteristics of completers and noncompleters of the intensive exercise program*		
	Completers n = 118; 81%	Noncompleters n = 28; 19%
Baseline sociodemographic characteristics		
Females, No. (%)	97 (82)	21 (75)
Participants with paid job, %	31	30
Age, years	54 (47–61)	53 (38–59)
Baseline disease characteristics		
Disease duration, years	5 (3–9)	5 (3–10)
Joint damage small joints, Larsen score	22 (2–55)	35 (13–75)
Joint damage large joints, Larsen score	1.5 (0–4.5)	2 (0–5.5)
Disease activity, DAS4	3.2 (2.6–4.0)	3.3 (2.7–4.3)
Functional ability, HAQ (0, high to 3, low)	0.63 (0.25–1.0)	0.81 (0.25–1.4)
Quality of life, RAQoL (0, high to 30, low)	11 (6–17)	12 (6–20)
Baseline exercise beliefs		
Outcome expectations (−2, 2)	1.0 (0.50–1.50)	1.0 (0.25–1.50)
Self efficacy (−4, 4)	2 (1–3)	2.5 (0.5–3)

* Unless otherwise stated, medians (interquartile range) are presented. DAS4 = Disease Activity Score based on 4 variables; HAQ = Health Assessment Questionnaire; RAQoL = Rheumatoid Arthritis Quality of Life questionnaire.

Table 4. Percentage of participants agreeing with RAPIT exercise parameters after year 1 and 2*			
	Should be lower (1st/2nd year)	Is good as it is (1st/2nd year)	Should be higher (1st/2nd year)
Intensity of exercise program	9/12	84/74	7/14
Number of sessions per week (In RAPIT: 2 times a week)	25/50	70/45	5/5
Duration of exercise program (In RAPIT: 75 minutes each session)	8/11	85/83	7/7
Number of patients within exercise class (In RAPIT 10–15 patients per class)	5/4	91/88	4/6

* RAPIT = Rheumatoid Arthritis Patients In Training.

Table 2. Correlation of attendance rates and several variables for exercise participants (n = 137)*	
	Spearman's rho
Baseline sociodemographic characteristics	
Sex (female = 1, male = 0)	−0.04
Employment, hours work of all participants†	−0.13
Age, years	0.17‡
Baseline disease characteristics	
Disease duration, years	−0.12
Joint damage small joints, Larsen score	0.03
Joint damage large joints, Larsen score	0.03
Disease activity, DAS4	−0.21‡
Pain, VAS (0, low to 10, high)	−0.14
Functional ability, HAQ (0, high to 3, low)	−0.17‡
Quality of life, RAQoL (0, high to 3, low)	−0.25§
Baseline exercise beliefs and habits	
Outcome expectations (−2, 2)	−0.02
Self efficacy (−4, 4)	0.03
Previous exercise habits (1, 5)	−0.02
Disease characteristics during training period	
Increase in joint damage, change in Larsen score	−0.08
Mean disease activity during period, mean DAS4 score	−0.20‡
Mean pain during training period, mean VAS score	−0.31‡
Retrospective measures of pain related to exercise sessions and satisfaction	
Frequency of pain during/after exercise sessions	−0.29‡

* In this analysis, the group of noncompleters who ended the exercise program because of severe comorbidity not related to RA (n = 9) was not included. DAS4 = Disease Activity Score based on 4 variables; VAS = visual analog scale; HAQ = Health Assessment Questionnaire; RAQoL = Rheumatoid Arthritis Quality of Life questionnaire.
† Patients without a job were included in this analysis as having 0 hours work.
‡ $P < 0.05$.
§ $P < 0.01$.

Table 5. Exercise program parameters of intensity*				
		Bicycling		Circuit
		Duration of intensive bicycling (minutes)	Heart rate (% of predicted MHF)	Proportion exercise/test (seconds)
1	Weeks 1–8	5–10	50–80	90/60
2	Weeks 9–16	10–12	60–80	90/50
3	Weeks 17–24	13–14	70–90	90/40
4	Weeks 25–32	15–16	70–90	90/30
5–12	Weeks 33–96	16–18	70–90	90/30

*MHF = Maximal Heart Frequency.

Table 3. Results of part I of the satisfaction questionnaire after first and second years*				
	After first year		After second year	
	Importance	Performance	Importance	Performance
An establishment where group exercise therapy is given must . . .				
be easy to reach	2.03 (0.06)	96.9	1.97 (0.05)	97.6
have adapted facilities for patients with RA (raised toilet for example)	1.70 (0.08)	69.2	1.66 (0.07)	76.0
have proper exercise equipment	2.18 (0.06)	98.5	2.20 (0.05)	96.8
have provisions for the participants (good showers, changing rooms, etc.)	1.75 (0.07)	87.7	1.83 (0.06)	89.6
Group exercise therapy for RA patients must . . .				
adjust the intensity of the exercise according to the severity of my RA	1.91 (0.06)	83.1	2.06 (0.06)	85.6
be adapted to the problems I experience as a result of my RA	1.80 (0.07)	83.8	1.88 (0.07)	82.4
be given at a time that best suits me	1.48 (0.07)	–	1.42 (0.07)	–
be offered to patients for no or limited contribution	1.74 (0.08)	–	1.62 (0.08)	–
be relaxing and pleasurable	2.06 (0.06)	95.4	2.11 (0.06)	96.8
be varied	2.01 (0.05)	94.6	2.02 (0.06)	94.4
have an apparent positive effect on my health	2.10 (0.06)	81.5	2.15 (0.06)	84.0
take into account the variable nature of RA (at one time it causes much more complaints than another time)	2.02 (0.06)	92.3	2.04 (0.06)	94.4
Instructors of an exercise group must . . .				
always take these problems seriously	2.24 (0.05)	96.2	2.23 (0.05)	97.6
be attentive to the problems of each participant	1.91 (0.06)	94.6	1.98 (0.06)	96.8
be punctual for appointments	1.90 (0.06)	97.7	1.95 (0.06)	97.6
have consideration for what RA means to the participant and their environment	1.99 (0.06)	92.3	1.99 (0.06)	88.1
have sufficient knowledge about rheumatoid arthritis	2.31 (0.05)	93.8	2.33 (0.05)	92.1
know which problems participants could face due to their rheumatoid arthritis	2.26 (0.05)	79.2	2.24 (0.06)	89.7

* Importance score ranges from 0 (not important at all) to 3 (very important). Numbers in parentheses are standard error. Performance is the percentage of patients who rated this aspect as "on the whole good" or "good." RA = rheumatoid arthritis.

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APPENDIX A: RAPIT EXERCISE PROGRAM

Each session had 3 parts: bicycle training (20 minutes), exercise circuit (20 minutes), and sport or game (20 minutes). Each training session was preceded by a warm up and ended with a cool down.

Bicycle training

Participants started with continuous intensive bicycling (cycling frequency 50–70 revolutions per minute) for 5 minutes. Within a time period of a half year, the duration of intensive bicycling increased to 18 minutes (Table 5). Bicycle load was based on 2 indicators: 1) heart rate during bicycling and 2) rating of perceived exertion (33). Heart rate during the bicycling training had to be between approximately 70% and 90% of the predicted maximal heart rate. Prediction of maximal heart rate was calculated with the formula 220 – age (34). The rating of perceived exertion (RPE) also was used to obtain more subjective information (35). A rating of 4 to 5 on the RPE (range 0–10) was expected to reflect an effort with enough intensity to improve cardiovascular fitness (36,37).

[TABLE 5]

Exercise circuit

The exercise circuit consisted of 8–10 different exercises intended to improve muscle strength, muscle endurance, joint mobility, and activities of daily living (walking, turning- around-in-bed, getting up, lifting, etc). Exercises were interspersed with rest. The proportion of exercise duration/ rest duration changed from 90 seconds/60 seconds in the first weeks of the program to 90 seconds/30 seconds after half a year (Table 5). Within the exercise duration, each exercise was repeated about 8–15 times. The exercises within the circuit were changed every 8 weeks. A group of supervisors met every 8 weeks to evaluate the actual training circuit and to develop a new circuit.

Sport or game

Each exercise session was finished with a kind of sport or game. Examples of sport activities and games used are badminton, volleyball (if necessary with a soft ball), indoor soccer (with a low-weight ball), basketball, relay games, pat-catch games.