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Professional practices and recommendations

The value of individual or collective group exercise programs for knee or hip osteoarthritis. Elaboration of French clinical practice guidelines

V. Tiffreau[a,*], D. Mulleman[b,*], E. Coudeyre[c], M.M. Lefevre-Colau[d], M. Revel[e], F. Rannou[e]

[a] *Service de médecine physique et de réadaptation, hôpital Swynghedauw, CHRU de Lille, 59035 Lille cedex, France*
[b] *Service de rhumatologie, université François-Rabelais Tours, CHRU de Tours, hôpital Trousseau, 37044 Tours cedex 09, France*
[c] *Centre de médecine physique et réadaptation Notre-Dame, BP 86, 4, avenue Joseph-Claussat, 63404 Chamalières cedex, France*
[d] *Service de médecine–physique et de réadaptation, hôpital Corentin-Celton (APHP), université Paris-V, 92133 Issy-les-Moulineaux, France*
[e] *Service de rééducation, APHP, université Paris–Descartes, groupe hospitalier Cochin, 75014 Paris, France*

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Abstract

Objective. – To develop clinical practice guidelines concerning individual and group exercise therapy for knee and/or hip osteoarthritis (OA).

Method. – We used the SOFMER (French Physical Medicine and Rehabilitation Society) methodology, combining systematic literature review, collection of everyday clinical practice, and external review by a multidisciplinary expert panel, to develop the guidelines.

Results. – Physical exercises are proposed for knee and hip OA. The benefit of individual exercises is low to moderate for pain, strength and ability to walk. The effectiveness is not maintained over time if the individual exercise program is not continued. The benefit of group exercise is also low to moderate for pain, strength, balance and ability to walk. There is no evidence of the superiority of one modality over the other (individual or group).

Conclusion. – More randomised controlled trials with good methodology are needed to compare the effectiveness of individual versus group exercise therapy for knee and hip OA.

Keywords: Osteoarthritis; Hip; Knee; Exercise; Effectiveness; Collective; Individual

1. Introduction

Exercise therapy for lower-limb arthritis should improve articular range of mobility, muscle and tendon lengthening, strength, endurance, pain and cartilage structure. Functional improvements are expected in walking ability and daily activities such as dressing, washing and driving a car, even sport. Exercise therapy and physiotherapy are recommended for lower-limb arthritis as physical treatment, but what comprises effective physical treatment lacks precise definition [11,32].

The possible modalities of exercise treatments are numerous and depend on the rhythm, duration and type or technique and whether conducted individually or in groups, but recommendations for individual or group exercise in terms of effectiveness are lacking. Adherence with group exercises could be better than with individual exercises because with the former, meetings are regular, which could improve motivation. However, the superiority of collective over individual exercises is not proven.

We aimed to develop practice guidelines concerning individual and collective exercise therapy for knee and/or hip osteoarthritis (OA).

2. Materials and methods

The SOFMER 3-stage method for developing guidelines involves systematic literature review, collection of information about professional practice and final scientific committee review [23].

Literature search professionals systematically searched the PubMed, Pascal Biomed, and Cochrane Library databases for articles published between January 1966 and January 2006. They used search terms defined by the scientific committee,

* Corresponding author.
E-mail address: v-tiffreau@chru-lille.fr (V. Tiffreau).

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created as one of the requirements of the SOFMER methodology. Keywords were proposed by the steering committee, which consisted of physicians in physical medicine and rehabilitation (PMR) and rheumatology and orthopaedic surgeons. The keywords were osteoarthritis, hip, knee, rehabilitation, physiotherapy, exercise therapy and physical therapy. Selected were abstracts of studies of all design that included an abstract, were published in English or French, and investigated adult human patients. The literature search professionals sent abstracts to the scientific committee, which then narrowed the selection of abstracts by ensuring that "rehabilitation intervention" was present in the abstract and then requested the full-length articles from the professional literature searchers. Two experts from two different medical specialties (DM, a rheumatologist, and VT, a PMR physician) selected articles related to exercise treatment in lower limb arthritis. Finally, pertinent abstracts of articles cited in references were investigated.

The quality of each manuscript was assessed according to the grading scale of the French Agency for Accreditation and Evaluation in Healthcare (Anaes) [23]. Low-quality studies were excluded because of inadequate randomization, insufficient number of subjects and/or unclear interventions.

2.1. Daily practice

Data on physicians' daily practice for preoperative rehabilitation were collected at the national congresses of rehabilitation (SOFMER Congress, Rouen, France, October 18, 2006) and rheumatology (SFR (Société Française de Rhumatologie) National Congress, Paris, December 4, and 5, 2006), with use of an electronic voting device. After the data collection, one of the two medical experts (VT and DM) presented the results of the literature search. Then, the session was open for questions and comments. A medical secretary took notes during the question-and-comment period.

2.2. Elaboration of guidelines and external review by a reading committee

Practice guidelines based on daily practice data as collected above and literature review were written. These guidelines were reviewed by the scientific committee before their validation by a reading committee.

3. Results

The scientific committee selected 74 articles from Pascal Biomed, 172 from Pubmed and 6 from the Cochrane database. From these articles, the reviewers selected 29 articles, from which 21 concerned knee arthritis [1–5,10,12,13,15–22,24,26–28,31], one hip arthritis [25] and 7 knee and hip arthritis [6–9,14,29,30].

3.1. Outcome measures

Various outcome measures were reported: analytical evaluations (i.e. range of motion, isokinetic or isometric maximal voluntary force, balance tests and posturography, VO_2max, level of spontaneous pain or pain while walking), functional evaluations (i.e. 6-min walk test, timed get-up-and-go test, ascending and descending stairs), self-reported measures (Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Arthritis Impact Measurement Scale (AIMS), Activities of Daily Living (ADL)), or non-steroidal anti-inflammatory drug (NSAID) therapy. The articles did not describe the impact of exercise on surgery decision.

3.2. Interventions

Different modalities of exercise were studied. The modalities and the methodology are in Table 1. Modalities of exercises were as follows:

- static or dynamic, resistive, isokinetic, with immersion, global or analytical lower-limb muscle strengthening;
- endurance training;
- balance training;
- passive mobilization, muscle and tendon lengthening.

3.3. Individual exercise programs

Individual exercise programs were supervised by a physiotherapist in a rehabilitation care or community-based centre or conducted alone at home as an auto-rehabilitation program (Table 2a). Exercises conducted at home were monitored by a physiotherapist during regular visits at the care centre or by phone call [26]. The frequency of exercise sessions was 1–3 per week and duration 20–90 min.

Eleven studies evaluated the benefit of individual exercises, 7 of Anaes level 1 quality [7,18,21,22,26,29,30], 2 of level 2 [1,10], and 2 of level 4 [6,28]. The outcome measures evaluated were pain, muscle strength, walking performance, ascending and descending stairs and quality of life (QoL). The most frequently studied outcome measure was the WOMAC score. The studies showed a low to moderate benefit of individual exercise for pain (up to 36% improvement on a visual analogue scale [VAS] [22]), walking ability and muscle strength. Improvement was evaluated at the end of the exercise treatment. Two studies showed a decrease in benefit one year after the end of the program [1,22].

Treatment durations were from 5 weeks to 2 years (one study [26]). The duration of follow-up was from 8 weeks to 2 years. Thomas et al. studied the impact of long-term home

Table 1
Exercise modalities of the studies

Modalities	Number of studies	References
Individual controlled	11	[1,6,7,10,18,21,22,26,28–30]
Collective controlled	9	[2,8,9,12–14,24,25,27]
Collective non controlled	3	[3,20,31]
Collective followed by individual controlled	2	[17,19]
Collective vs. individual controlled	2	[4,5]
Collective vs. individual non controlled	2	[15,16]

Table 2
Description of the studies

Authors	Publication Date	Intervention	Duration of exercise program	Duration of follow-up	Outcome measures	Sample size	Level of evidence[a]
Individual exercises – controlled studies (a)							
O Reilly SC	1999	Daily reinforcement exercises	3 months	3 months	WOMAC, pain on walking (VAS) or climbing stairs, isometric strength, SF-36, HAD score, NSAID intake	78/113	1
Thomas KS	2002	Exercices vs. exercices ± telephone contact ± placebo	24 months	24 months	WOMAC, SF-36, HAD score, isometric strength	6 groups (n=786)	1
Heuts PH	2005	Supervised home exercises	6 weeks	21 months	Pain (VAS) WOMAC, Patient–specific functional status	149/148	1
Van Baar ME	2001	Individual physical therapy	3 months	9 months	Use of NSAIDs, pain (VAS), video (Keefe), IRGL, hand-held dynamometry, range of mobility	99/102	1
Quilty B	2003	Community Centre based Physical Therapy	10 weeks	12 months	Pain (VAS), WOMAC, maximal voluntary strength of knee extensors	87/43	1
Van Baar ME	1998	Individual physical therapy	12 weeks	24 weeks	Use of NSAIDs, pain (VAS), video (Keefe)	99/102	1
Petrella RJ	2000	Home exercises + axaprozine vs. axaprozine alone	8 weeks	8 weeks	WOMAC, pain (VAS)	88/89	1
Hurley MV	1998	Individual reinforcement	5 weeks	6 months	Isometric stength of knee extensors, proprioception, 50-foot walking speed, standing from a seated position, Lequesne index	60/37	2
Baker KR	2001	Home exercises and visit from the physician	4 months	4 months	WOMAC, manual muscle testing, QoL SF-36	23/22	2
Halbert J	2001	Supervised Home Exercises	12 months	12 months	Walking frequency, WOMAC, SF-36	37/32	4
Topp R	2002	anisometric vs. Isometric exercises	16 weeks	16 weeks	Climbing stairs time, WOMAC, NSAID intake	32/35/35	4
Group exercises – controlled studies (b)							
Hopman-Rock M	2000	Group exercises and education	6 weeks	6 months	AIMS (IRGL) pain (VAS), QoL (SF-36, VAS), Range of mobility, isometric muscle strength, 20-min walking speed, get-up-and-go test	60/60	1
Tak E	2005	Group exercises (hip arthritis)	8 weeks	5 months	Harris hip score, SIP, Groningen scale, get-up-and-go test, walking, stairs, pain (VAS), QoL (VAS)	55/54	1
Kovar PA	1992	Group fitness	8 weeks	8 weeks	6-min walking test, AIMS	47 /45	1
Hughes S	2004	Group fitness	8 weeks	6 months	Lorig, WOMAC, 6-min walking test, TEMED STAND (Guralnick)	80/70	2
Rogind H	1998	Group fitness and daily home exercises	3 months	12 months	Isokinetic muscle strength measurement, AFI, pain, walking speed, physical examination, balance.	12/13	2
Lin SY	2004	Exercises in a swimming pool	12 months	12 months	WOMAC, walking speed, stairs, muscle strength, range of mobility, drugs	66/40	2
Thorstensson CA	2005	Group exercises	6 weeks	26 weeks	Knee injury and osteoarthritis outcome score, SF-36	28/28	2
Diracoglu D	2005	Reinforcement and balance exercises	8 weeks	8 weeks	WOMAC, SF-36, isokinetic muscle strength	33/33	4
Kuptniaratsai-kul V	2002	Reinforcement of the knee extensors	8 weeks	12 months	Walking distance, range of mobility, isometric muscle strength	199/193	4
Group exercises – uncontrolled studies (c)							
Peterson M	1993	Walk and education	8 weeks	8 weeks	6-min walking test and gait analysis	47	2
Ettinger WH	1997	Endurance training vs. reinforcement vs. health education	3 months	18 months	Disability score, 6-min walking test, X-ray score, pain, aerobic capacity	114 /146/ 149*	2

(continued)

Table 2 *(continued)*

Authors	Publication Date	Intervention	Duration of exercise program	Duration of follow-up	Outcome measures	Sample size	Level of evidence[a]
Weigl M	2004	Group multidisciplinary rehabilitation	4 weeks	12 months	NSAID intake, WOMAC	128	2
Group exercises followed by individual exercises —controlled studies (d)							
Messier SP	2000	Community based training followed by home training	18 months	18 months	Posturography	34/36	2
Penninx B	2001	Resistive exercises vs. endurance exrcises	3 months	18 months	ADL Katz, body mass index, 6-min walking test, VO_2max	88/80	1
Comparing group and individual exercises – controlled studies (e)							
Fransen M	2001	Individual physical therapy vs. group exercises	8 weeks	16 weeks	WOMAC, SF-36, gait analysis, isometric strength	43/40/43	1
Evcik D	2002	Walking vs. Home exercises	3 months	3 months	WOMAC, pain (VAS), Nottingham Health Profile	30/30/30	2
Comparing group and individual exercises – uncontrolled studies (f)							
Mc Carthy CJ	2004	Home exercises vs. group exercises	8 weeks	12 months	ALF, 8-min walking speed, stairs, standing from a seating position, pain (VAS), WOMAC	111/103	2
Maurer BT	1999	Isokinstic reinforcement vs. group exercises	8 weeks	8 weeks	AIMS, WOMAC, SF-36, walking pain, isokinetic strength	49/49	2

WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; ALF: Aggregate Locomotor Function; HAD: Hospital Anxiety and Depression Scale; AIMS: Arthritis Impact Measurement Scale;VAS: visual analog scale; SF-36: Medical Outcomes Study Short Form 36; ADL: Activities of Daily Living.

[a] French Agency for Accreditation and Evaluation in Healthcare (ANAES) level (quality) of evidence.

treatment (2 years), showing a benefit for pain, muscle strength, and range of mobilization at 2 years [26].

3.4. Group exercise programs (Table 2b, c)

Group treatment was conducted in specialised centres or as a group session followed by home individual exercises. The exercises involved strengthening resistance (weight bearing, isokinetic strengthening) or aerobic training (walking, treadmill, cycling). Treatment durations ranged from 8 weeks to 3 months (except for one study of 18 months [17]), and follow-up ranged from 8 weeks to 18 months.

Of the nine selected controlled studies, three were of Anaes level 1 quality [8,12,25], four of level 2 [9,14,24,27] and two of level 4 [2,13]. Three uncontrolled studies were of level 2 quality [3,20,31].

Studies showed a moderate benefit for pain, muscle strength, walking, balance and function. One study reported the impact of the collective modality on patient adherence to treatment [9]. QoL was not significantly improved. One study showed QoL maintained in the treatment group but decreased in the control group [8].

3.5. Combination of group exercise program followed by individual program

Two studies described collective treatment followed by individual treatment, one of Anaes level 1 quality [19] and one of level 2 [17] (Table 2d). Penninx et al. described the benefit of exercise in preventing function deterioration during early knee OA [19]. Meisner et al. investigated the impact of this program on balance [17].

3.6. Collective versus individual exercise programs

Two controlled studies compared individual versus collective exercise treatments, one of Anaes level 1 quality and one of level 2 [4,5] (Table 2e,f). Fransen and associates studied the effectiveness of physical therapy in three randomized groups of patients with knee OA [5]. The interventions were individual treatment ($n = 43$) and small-group format ($n = 40$), with no intervention in the control group ($n = 43$). With 8-week treatment and 16-week follow-up, the study showed a significant improvement in both treatment groups for pain, physical function (WOMAC) and health-related QoL (Medical Outcomes Survey Short Form 36) than in the control group, but no significant difference in effectiveness between the two treatment groups [5]. Evcik et al. showed no difference in effectiveness between a collective exercise of walking and home-based individual physical therapy, except for a mild improvement in perceived health with the NHP in the collective arm [4]. Two other studies were of Anaes level 2 quality. McCarthy et al. compared individual unsupervised exercises with collective supervised exercises and found a benefit with the collective exercise [16]. Maurer and associates found that strengthening induced by individual isokinetic exercises was greater than with collective exercise therapy [15].

Table 3
Rehabilitation modalities and osteoarthritis of the lower limb: comparison between physical medicine and rehabilitation (PMR) specialists and rheumatologist practice

Which modality of supervised exercises do you prescribe for osteoarthritis of the hip?	*PMR* (%)	*Rheumatologists* (%)
Individual supervised exercises at the physical therapist office	83	63
Home exercises	1	4
Group exercises at the physical therapist office	4	21
Exercises in a rehabilitation centre	4	8
Other	8	4
Which modality of supervised exercises do you prescribe for osteoarthritis of theknee?		
Individual supervised exercises supervised at the physical therapist office	87	75
Home exercises	2	0
Group exercises at the physical therapist office	3	10
Exercises in a rehabilitation centre	4	10
Other	4	5

Data are percentage practitioners prescribing therapy.

3.7. Everyday clinical practice (Table 3)

The clinical practice of rheumatologists and PMR specialists was almost similar in terms of prescribing individual and collective exercise. Nevertheless, PMR specialists prescribed more individual exercises by a physical therapist (83%) than rheumatologists (63%) for hip OA and for knee OA (87 vs. 75%, respectively).

4. Discussion

A systematic review of the medical literature by use of the SOFMER method for developing clinical practice guidelines allowed us to answer a few question about the effectiveness of exercise therapy for knee and/or hip OA. The effectiveness of exercise therapy has been well studied, with, until now, no clear information about the benefit of different exercise modalities. In the present work, we differentiated study results on the basis of the collective or individual modality of exercises. We determined a benefit of exercise, not distinguished by individual or group modality, for lower-limb OA, for a moderate effect on pain, strengthening and ability to walk, and no results on the superiority of individual versus group therapy for knee and/or hip OA.

Because of the great variability in techniques and procedures in terms of frequency or length of exercises, interpretation of study results was difficult. The type of collective exercises was variable, ranging from walking [3,20], to balneotherapy [24] to collective fitness. Individual exercise programs were also varied; they could be conducted by a physiotherapist in a rehabilitation centre [22] or realised as a home-based program with a regular phone call from a practitioner [26]. The aim of the exercise program was not always clearly described and was interpreted in terms of the natural course of the disease. The benefit was sometimes improvement of the initial physical state but also stabilization of condition (preventive effect) [6]. The studied populations were often heterogeneous, and the treatment procedure was never individually adapted to the clinical features (i.e. internal or external knee arthritis), so determining an effect on function was difficult. As a result, we could not distinguish the best exercise program for lower-limb OA in terms of modality (individual or collective) depending on clinical features, but we could determine the effectiveness of exercise for lower-limb arthritis on pain and disability.

No important negative side effects or complications were described. This is important information, since many practitioners still consider active exercises injurious and not always indicated. The major factor seems to be the benefit of exercise on avoiding sedentarism [6].

Our findings suggest that exercise therapy is indicated for lower-limb OA and that exercises programs must be developed.

5. Recommendations

Physical exercises are proposed for knee and/or hip OA. The benefit of individual exercise is low to moderate for pain, strength and ability to walk. The effectiveness is not maintained over time if the exercise program is not continued. The benefit of collective exercise is low to moderate for pain, strength, balance and ability to walk. There is no evidence of the superiority of one modality over the other (individual or collective).

More randomised controlled trials with good methodology are needed to compare the effectiveness of these two modalities of exercise for knee and hip OA.

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