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Review

Educating patients about the benefits of physical activity and exercise for their hip and knee osteoarthritis. Systematic literature review

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ABSTRACT

Objectives: Highlight the role of patient education about physical activity and exercise in the treatment of hip and knee osteoarthritis (OA).
Methods: Systematic literature review from the Cochrane Library, PubMed and Wiley Online Library databases. A total of 125 items were identified, including 11 recommendations from learned societies interested in OA and 45 randomized controlled trials addressing treatment education and activity/exercise for the treatment of hip and knee osteoarthritis.
Results: In the end, 13 randomized controlled trials and 8 recommendations were reviewed (1b level of evidence). Based on the analysis, it was clear that education, exercise and weight loss are the pillars of non-pharmacological treatments. These treatments have proven to be effective but require changes in patient behaviour that are difficult to obtain. Exercise and weight loss improve function and reduce pain. Education potentiates compliance to exercise and weight loss programs, thereby improving their long-term benefits. Cost efficiency studies have found a reduction in medical visits and healthcare costs after 12 months because of self-management programs.
Conclusion: Among non-surgical treatment options for hip and knee osteoarthritis, the most recent guidelines focus on non-pharmacological treatment. Self-management for general physical activity and exercise has a critical role. Programs must be personalized and adjusted to the patient's phenotype. This development should help every healthcare professional adapt the care they propose to each patient. Registration number for the systematic review: CRD42015032346.

1. Introduction

Osteoarthritis (OA) is the most common chronic joint disease and it greatly contributes to functional disability and loss of autonomy in the elderly [1]. Nearly 40% of persons above 65 years of age have some type of symptomatic OA [2]. The prevalence of OA increases as a function of age. The highest prevalence is in the hip, hand and knee (in that order). But this clinical diagnosis, which is later confirmed with standard radiographs, is often made late.

Recent studies tend to show a higher prevalence of mortality in OA patients than in the general population [3]. In fact, an increase in all causes of mortality has been found among patients suffering from arthritis, including knee and hip OA. The main causes of mortality are comorbidities such as diabetes, cancer, cardiovascular disease, along with the inability to walk [3]. However, a more recent study found no significant differences between these two populations [4].

OA has long been considered a degenerative disease that is inevitable with age and cannot be stopped until the joint is replaced by a prosthesis. Even today, there is no truly curative treatment but current practices have evolved thanks to non-pharmacological, multidisciplinary care. These treatments require a change in lifestyle, with a focus on combating our increasingly sedentary way of life and weight gain. Regular physical activity in arthritis patients is effective at reducing pain and improving the function [5].

In 2002, the National Health Interview Survey found that arthritic patients were less physically active than the general population; in fact, 37% of the arthritic population is inactive. This sedentariness is associated with age, education level, functional limitations, access to fitness centres and mixed anxiety-depressive disorders [6]. It can also be related to gender and BMI [7].

Without regular physical activity, muscle strength decreases. But we know that to stabilize the knee and stop the OA from

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getting worse, strength in the quadriceps and peripheral muscles around an injured joint is vital [8]. A person's physical activity level can be determined using standardized questionnaires such as the IPAQ (Appendix A). This questionnaire measures the amount of physical activity over a 1-week period [9]. It is validated in patients with knee and hip OA. Studies have shown that the amount of physical activity differs depending on the OA location. It is lower in patients with hip or knee OA because of physical limitations in the legs. Overall, arthritic patients have a lower level of physical activity than the general population [10,11].

Muscle mass peaks at about 30 years of age; it then decreases 3–8% per decade, with even faster loss after 60 years of age. The most recent international definitions of sarcopenia have added decreased function due to less force-generating ability to the classic reduction in muscle mass criterion [12]. It affects at least 20% of the population above 70 years of age, and affects more than 50% of those above 75 years, with predominance in the lower limbs. In arthritic patients, sarcopenia contributes to greater dependency due to loss of autonomy [13].

According to Costill et al. [14], the effects of training on body composition are similar in both elderly and younger subjects. Age does not seem to impact the strength gains and muscle hypertrophy that result from training. These strength gains are associated with increased cross-sectional area of both slow and fast-twitch muscle fibres. But the percentage of slow-twitch muscle fibres does not change with strength training. Instead, there is a specific increase in the type IIa fast-twitch fibres and a decrease in the type IIb fast-twitch fibres. The effects of aerobic training in the elderly are mainly due to an increase in oxidative capacity. These gains are similar in healthy people, no matter their age, gender or starting physical condition. Because of these physiological adaptations, an exercise program that combines strength and endurance work in arthritic patients could increase their functional capacity and reduce their pain.

However, to be fully effective, this exercise program must be accompanied by measures that improve treatment adherence [15]. Many recommendations, including those of the EULAR [16], confirm that a combination of treatments is more effective than a single treatment. This suggests that patient education will help them adhere to programs because they will have a better understanding of their condition [17] and treatment methods. And by identifying barriers to treatment compliance, these educational approaches can be used to set treatment objectives and action plans with buy-in from patients and therapists.

2. Objective

The main objective of this systemic review was to demonstrate the role of patient education about physical activity and exercise in the treatment of hip and knee OA based on the latest practice recommendations and data from randomized controlled trials (RCTs). The secondary objective was to focus on the obstacles and drivers for adhesion to physical activity programs.

3. Methods

The review of literature is registered with the "Centre for Reviews and Dissemination" PROSPERO. Registration number: CRD42015032346.

The eligibility criteria were the PICOS characteristics. Of interest were studies of non-pharmacological treatment of knee OA, more specifically educational and physical activity programs. We looked at RCTs and written recommendations published in English from 2000 to 2015. We selected these parameters to provide a historical perspective for relatively recent data and "1b level and grade of evidence" to ensure that our review was relevant and credible.

The Cochrane Library, PubMed, and Wiley Online Library databases were searched between February and December 2015. The last search was performed on December 31, 2015. Studies were selected from these databases using the following keywords: *knee/hip and osteoarthritis/self-care/self-management/self-efficacy and physical activity/exercise*. Our sample was supplemented by looking through the reference list of high-quality studies. The first sort was made by reading the title, abstract and then the articles. Only the following were retained: articles written in English, recommendations from learned societies dedicated to OA, and high-quality RCTs about treatment-based education for physical activity and exercise programs.

Our methods consisted of a systematic review of literature. We used the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) analysis grid. The eligibility criteria for inclusion into the systematic review were based on PICOS. Inclusion was done with the endorsement of the investigator (EC). Data was extracted into a template established before starting the searches and then verified by double reading. Several variables for which data was collected were defined: patients suffering from knee OA who are the beneficiary of an educational and physical activity program with at least 3 months' follow-up. These variables are consistent with the PICOS items. The funding sources were checked to make sure there were no conflicts of interest.

The Cochrane Risk of Bias Assessment Method was used to evaluate the RCTs. For each study, we referred to the CONSORT grid typically used when performing RCTs. We then checked that the level and grade of evidence actually met our "1b" requirements. In addition, the patients had to be followed for at least 3 months. Articles with low-quality methodology (inadequate randomization, insufficient number of subjects, vague procedures) were excluded. Any recruitment bias was brought out. Volunteer-based recruitment can lead to inclusion of subjects that are more predisposed to changing. Having a large number of subjects in a study can reduce this bias. In addition, having some patient-reported outcomes (e.g., number of hours performing physical activity) can induce a bias in the results. This information is predominantly found in the Discussion section of articles.

4. Results

One hundred and twenty-one articles were read, including 45 RCTs and 11 recommendations. Only 13 RCTs and 8 recommendations were retained (Fig. 1).

The recommendations made it possible to classify the various treatments based on their level of evidence. The triad of education, exercise and weight loss make up the first line of non-pharmacological treatments (Table 1).

The selected RCTs allowed us to more specifically analyse the suggestions within the main recommendations and provided further detail about the practical implementation of these interventions (Tables 2 and 3).

These studies have two potential biases: selection bias and data collection bias. Volunteer-based recruitment can result in the inclusion of subjects who are more prone to changing [18]. Having a large number of subjects helps to reduce this bias [19]. Subjects can be asked to report some information themselves, for example the number of hours of physical activity [20]. This data can be either overestimated or underestimated by patients. Having a large number of subjects will also help to smooth out these data.

4.1. Current international recommendations for the treatment of hip and knee OA

Various practice guidelines have been published over the past 10 years (See Table 1 [2008–2014]). They were issued from various

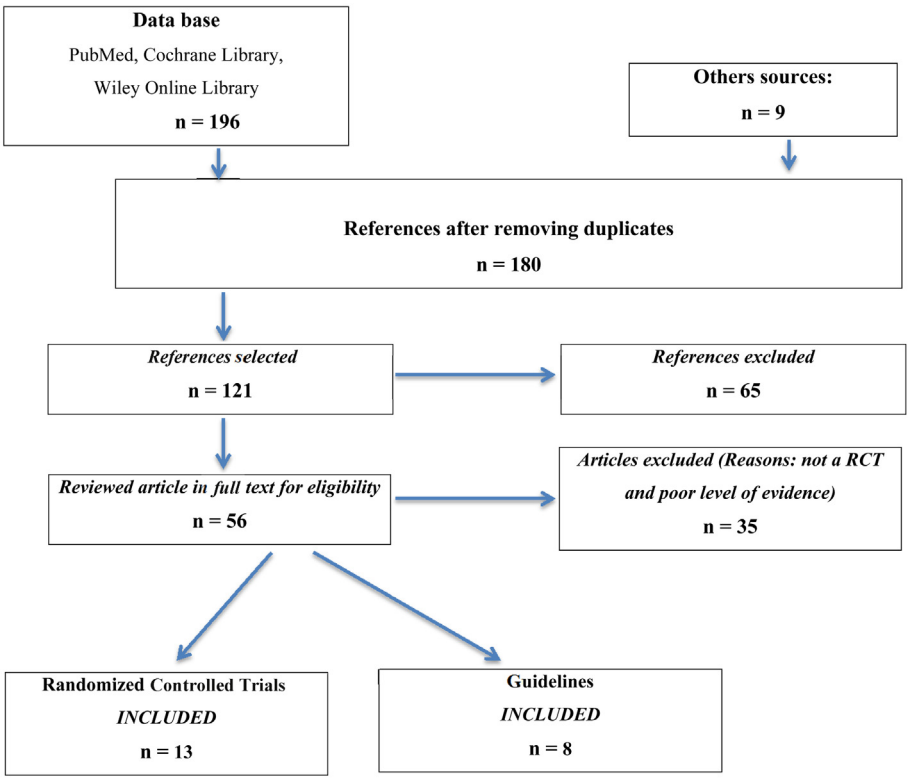

Fig. 1. Flow chart.

disciplines such as general practice (NICE [21], RACGP [22]), physical medicine and rehabilitation (SOFMER [15]), orthopaedics (AAOS [23]), rheumatology (ACR [24], EULAR [16]), or were multidisciplinary (OARSI [25], ESCEO [17]); various countries are represented.

Table 1
Guidelines with high level of evidence and their effect size.

Organization	Guidelines with high standard of proof and effect size	
OARSI	Exercise	Pain and function
2014	Weight loss	Pain and function
[25]	Education	Pain
ESCEO	Information/education	Treatment adherence
2014	Weight loss if overweight,	Function and pain
[17]	exercise (strength training, aerobic training)	Function and pain
NICE	Education	Pain, function, stiffness
2014	Exercise	Pain, function, stiffness
[21]	Weight loss	Pain, function, stiffness
	Biomechanical interventions	Pain, function, stiffness
AAOS	Education	Pain
2013	Exercise	Function
[23]	Weight loss	Disability
	Biomechanical interventions	Other symptoms
EULAR	Education	Pain
2013	Exercise	Pain and function
[16]	Weight loss	Pain and function
	Lifestyle changes	Pain and function
ACR	Exercise	Pain and function
2012	Weight loss	Pain and function
[24]		
RACGP	Weight loss	Pain and disability
NHMRC	Exercise	Pain and function
2009	Education	Treatment adherence
[22]		Pain, quality of life
SOFMER	Exercise	Pain and function
SFR	Patient education, and	Treatment adherence
SOFCOT	psychological support	
2008		
[15]		

4.1.1. History

Non-pharmacological treatments such as physical activity have been recommended by learned societies for the treatment of OA since 2000. Their role has evolved – non-pharmacological treatments now serve as the basis for treating this condition. The level of evidence is highest for the OA in the legs.

In 2008, NICE [21] proposed that "treatment of OA starts with a non-pharmacological approach, which forms the basis of any proposed pharmacological treatment". The ACR published recommendations in 2012 that were solely non-pharmacological [24]. EULAR [16] provided important details about non-pharmacological interventions in 2013. In 2014, the OARSI [25] described four phenotypes of arthritic patients and adapted the non-pharmacological treatments based on these phenotypes. Also in 2014, ESCEO [17] was the first organization to put forward a treatment algorithm to help practitioners navigate knee OA recommendations.

Given the lack of curative treatment other than joint replacement, it is essential that non-pharmacological treatments be pursued [26,27]. Exercise and patient education are the first-line recommendations for all these organizations. Next are weight loss and interventions to alter biomechanics, with a similar level of evidence (Appendix A) (Table 4).

4.1.2. Methods used by learned societies

The methods used to draw up recommendations were fairly similar between organizations. The first step was a systematic review of literature, followed by expert analysis. Next, a vote was organized by these experts to prioritize the various treatment methods. The OARSI, EULAR and AAOS all used the RAND UCLA appropriateness method and Delphi voting process [25].

The representation of health professionals has greatly changed within these experts. In the 2000s, the experts were mainly rheumatologists and orthopaedic surgeons [28]. Now, they consist of a multidisciplinary group of healthcare professionals that

Table 2
Randomized controlled trials with high level of evidence for exercise and patient education in hip and knee osteoarthritis.

Others	Population	Number of subjects	Group	Dosage Exercise and education	Outcome measures	Results
Palmer et al. 2014 [53]	Knee osteoarthritis	224	TENS + knee group (KG) Sham TENS + KG KG = education + exercise	30 min education (1 h/week) + 30 min exercise (1 h/week) = > 6 weeks (1 h/week)	WOMAC: function/pain/ stiffness adherence	S to 6–24 weeks: IG (NS BG) S to 6–24 weeks: IG (NS BG) S to 6–24 weeks: IG (NS BG)
Henriksen et al. 2014 [54]	Knee osteoarthritis	60	I C	1 h, 3 ×/week = > 12 weeks	PPTs TS, KOOS	S to 12 weeks S to 12 weeks
Tamara et al. 2012 [55]	Obese/overweight Knee osteoarthritis	232	Pain coping skills training Behavioral weight management PCST + BWM = I1 PCST alone = I2 BWM alone = I3 C	I2→ 12 1st weeks 60 min education group/weeks I3→12 1st weeks 60 min education group/weeks + 90 min exercise 3 ×/weeks + 12 weeks 2 groups = > education 1 h 1weeks/2	 AIMS Physical AIMS Psychological Weight	I1 S to 0, 6, 12 months S to 0, 6, 12 months S to 0, 6, 12 months
Brosseau et al. 2012 [52]	Knee osteoarthritis	240	Walking + behavioral intervention: I1 Walking: I2 C	I1 = 2 h/week I2 = 3 ×/week 6 months = > face to face 6 months = > phone	Adherence Standford scale Long-term adherence	S at 3 months: I1: IG NS BG = 3 groups with less abandonment 12, 18 months I1
Hurley et al. 2007 and 2012 [47]	Chronic knee pain	418	Usual primary care, C C+ individual rehabilitation, I1 C+ group rehabilitation, I2	15–20 min education (2 ×/week) + 35 to 45 min exercise (2 ×/week) = > 6 weeks (2 ×/week)	WOMAC Cost	S to 6, 18, 30 months: I1 and I2 S to 6, 18, 30 months: I1 and I2
Coleman et al. 2012 [18]	Knee osteoarthritis	146	Osteoarthritis of the knee self-management program (OAK): I C	2.5 h/week ETP = > 6 weeks	VAS Pain WOMAC function SF 36, TUG	S to 8 weeks S to 8 weeks and 6 months S to 8 weeks and 6 months, NS
Bezalel et al. 2010 [56]	Knee osteoarthritis	50	I C	Group training + exercise = > 4 weeks (45 min 1 ×/week) Later on = exercise at home	WOMAC function Sit to stand Get up and go	S to 4, 8 weeks NS stiffness NS S to 4,8 weeks NS BG
Ravaud et al. 2007 [19]	Knee osteoarthritis	867	Standard tools (ST) Exercises (E) ST + exercise Usual care (UC)	Education + exercise 30 min, 4 ×/week = > 24 weeks	VAS pain WOMAC function Measures quality of care	S to 24 weeks: IG (NS BG) S to 24 weeks: IG (NS BG) S to 24 weeks: IG (NS BG)
Yip et al. 2007 [20]	Knee osteoarthritis	120	I (ASMP) C	Education + exercise = 1 × 2 h/week = > 6 weeks	ASES, VAS, HAQ Exercise level	S to 16 weeks S to 16 weeks
Veenhof et al. 2006 [57]	Knee/hip osteoarthritis	200	Activities based on cognitive- behavioral (BGA): I Usual care: C	I: exercise + education messages I + C = 18 sessions = > 12 weeks	VAS WOMAC function MACTAR	NS benefits IG NS short and long term S to week 65
Bennell et al. 2005 [58]	Knee osteoarthritis	140	I (taping, exercise, massage) C (ultrasound)	30 to 45 min 1 ×/week = > 4 weeks 1 week/2 = > 8 weeks	VAS pain SF-36 Quality of life WOMAC function AQoL, Step test Quadriceps strength	S to 12, 24 weeks I and C S to 12, 24 weeks I NS (improvement I and C level of references) NS (improvement I and C level of references) NS (improvement I and C level of references)

Control group: C/intervention group: I; in group: IG/between group: BG; S: significant/NS: non significant.

Table 3
Randomized controlled trials: details about the interventions: exercise and education.

Authors	Exercise: modalities	Education	Modalities	Tools used
Palmer et al. 2014 [53]	Warm up: 5 minutes Circuit: 1 minute exercise–1 minute to move to the next station -> -> Strength/proprioception: progressive over 6 weeks	Setting of personal objectives Medical management of OA	Diet Home exercises Local community exercise opportunities	Booklet Home exercises Tool to aid goal setting
Henriksen et al. 2014 [54]	Warm up: 10 min, bike, intensity: moderate Training: strengthening/coordination/stability: core, hip, knee Difficulties: 6 level = A-F, repetitions: 2–3 × 6–8 exercises Method: strengthening	Importance of doing every exercise correctly and with proper technique	Exercises and progression in difficulty of these adjusted individually by physical therapist	The FITE-OA program Monitor knee pain intensity before, during, after training session (0 to 10)
Tamara et al. 2012 [55]	BWM: 12 first weeks: 90 min 3 ×/week Warm-up: 10 min > stretching + isometric strengthening: postural muscles 15 min (55% FCR) + 30 min (70% FCR) Aerobic: 60 min 1 week/2 12 following weeks: no supervision	PCST 12 first weeks: pain management 12 following weeks: interview PSCT BWM: weight loss 12 last: interview BWM	PCST: 60 minutes/week Attention diversion Cognitive-restructuring 60 minutes 1 week/2 Identification of difficulties 60 minutes/week Lifestyle, exercise, attitude, nutrition	BWM: group LEARN method Protocol on audio tape Manual PCST: group Role playing, bike Relaxation, imagery
Brosseau et al. 2012 [52]	Warm-up: 10 min light aerobic exercise Walking phase: 45 min -> aerobic 50–70% of HR max Cool down: 10 min -> light aerobic + stretching Progressively increase and maintenance: dosage, frequency, intensity	Discussing long-term goals Education Obstacles and drivers to adhere to the walking program	Long term Benefits of PA Moral support Self-management	PACE Ex Pedometer Log book Telephone support
Hurley et al. 2007 and 2012 [47]	Strength 35 to 45 minutes -> progressive = intensity/complex Aerobic -> individualized = capacity and disability Function/control Coordination	Diet Home exercises Drug management Pain management	Coping strategies Personal objectives and goal setting Action plan Diet and healthy eating	ESCAPE Knee Pain
Coleman et al. 2012 (18)	Detailed information every session Instruction and demonstration Flexibility, aerobic and balance 2.5 h per week	Physiopathology Exercise Pain management/medication	Goal setting Small-group discussion Actively encouraged	Interactive Moderate didactic content Modelling
Bezalel et al. 2010 [56]	Active ROM exercises > strengthening > stretching 45 min Daily life > straighten their leg out in front 5 s, 10 × each leg	Information OA Importance of performing exercise regularly Knee examination	Risk factors/information By physiotherapist	Detailed handout > instructions and photographs of the exercises
Ravaud et al., 2007 [19]	Joint mobility: 10 × Muscle power -> if pain allows, increase of 5 repetitions/week Up to a maximum of 30	Importance of motivation Exercise: 30 min with 5 repetition > demonstration by trainer	Usual care Home exercise Explanation: rheumatologist	Logbook => do completely Booklet > illustrating ex + videotape
Yip et al. 2007 [20]	Tai chi Walking Strengthening Weekly	Disease management Compresses Joint protection	OA consequences: pain, fatigue, daily activity, limitations, stress Hot/cold + maintaining the same joint + heavy load	Pedometer
Veenhof et al. 2006 [57]	Activity list (maximum 3) Evolution Individually tailored exercises > impairments limiting the performance of these activities are selected	Education messages Treatment Positive reinforcement Goal	No pain relief Improvement functioning Select activity and define short and long term goals	Performance charts > record and view the performance of activity and exercise
Bennell et al. 2005 [58]	12 first weeks: isometric: gluteus, adductors Concentric: adductors/gluteus/quadratus lumborum Balance: 3 ×/day + tapping 12 following weeks: on their own	Knee taping Soft tissue massage of the knee Thoracic spine mobilization Home exercise program	Therapist for first four weeks and by participant thereafter Symptomatic leg extended and elevated on a chair After four weeks	Log book Standardized home exercises Taping instruction sheets

Table 4
Exercise and education recommendations for hip and knee OA.

Organization	Exercise				Education			Modality/follow-up
	Type	Location	Intensity	Example	Education	Self-management	Support	
OARSI 2014 [25]	Strength Aerobic training Joint mobility	Legs Quadriceps	Moderate for multi-joint in water based	Tai chi Combination of land-based/water-based	Treatment goals Lifestyle changes (exercise, adaptation activities)	Weight loss of 5% (20-week period) Disease	Incentives Telephone	Individual, group-based, physical activity and advice by physiotherapist
ESCEO 2014 [17]	Strength Aerobic training Stretching exercises	Legs Quadriceps	Intensity and/or duration of exercise should be increased overtime	Water-based exercise Walking Tai chi	Term disease-related Lifestyle changes	Strategies joint protection 5% weight loss within 6 months		Individual, group-based, or home programs Refer to physiotherapist
NICE 2014 [21]	Strength training Local Aerobic capacity Stretching exercises		Individualized advice	Manipulation	Positive behavioral changes Weight loss/exercise Footwear	Strategy Disease Weight loss	Verbal and written information	Individualized evaluated by a health professional
AAOS 2013 [23]	Low-impact Aerobic exercises Strength training Proprioception Stretching exercises	Quadriceps		Walking Aquatic	Weight loss BMI > 25 Minimum of five percent (5%) of body weight	Care	Regular contact Rheumatologist Nurse Rehabilitation health educator	Physical activity with physiotherapist
EULAR 2013 [16]	Strength training (2 days/week) Isometric Aerobic moderate-intensity training (30 min/day) Stretching exercises Proprioception	Quadriceps and proximal hip girdle muscles	Moderate to vigorous intensity (60–80% of one repetition maximum) for 8–12 repetitions	Land-based exercises Aquatic	Nutrition education (limiting fat and salt intake, eating at least five portions of fruit and vegetables a day) Physical activity	Disease Motivation Relapse prediction and management Weight loss Behavior eating	Interview Include partners or caregivers Example DVD, website	Individual, group-based Reproduce at home Short practice but often
ACR 2012 [24]	Aerobic training Strengthening		Individual capacity and progression	Perform activities of daily living Land-based exercises Aquatic Tai chi (knee)	Thermal agent Joint protection		Evaluate activities of daily living	Initially participate in an aquatic exercise program in order to improve their aerobic capacity Evaluated by a health professional
RACGP NHMRC 2009 [22]	Resistance Strength Aerobic training Stretching exercises	Quadriceps	Moderate or low intensity	Land-based exercises Aquatic Tai chi	Lifestyle changes Nutritional Cognitive behavioral therapy, low calorie diet	Strategy Care Exercise Weight loss Pain	Home exercise program	Telephone support Health professionals (rheumatologist, orthopedic surgeon, other specialists)
SOFMER SFR SOFCOT 2008 [15]	Frequent practice The program should be individually tailored to physical capacity and pain	Legs	Frequent sessions of mild-to-moderate exercise Using a pedometer	No specific type of exercise has been proven superior to other types	Program to raise awareness of the importance of physical activity	Self-evaluation via a daily exercise diary	Long-term follow-up/support by family and friends	In group or on individual basis, physical activity taught by physical therapist then performed at home

participate in OA care. The addition of specialists in physical medicine and rehabilitation, physical therapy, occupational therapy, nutrition, and nursing has resulted in the recommendations evolving, particularly for non-pharmacological treatments, although the various disciplines are distributed differently within the expert groups of these learned societies.

4.1.3. New role of education about physical activity and exercise

The common guiding principle of these latest recommendations is the more specific contribution of non-pharmacological care. They take into account the fact that hip and knee OA are associated with a large number of factors and with musculoskeletal and extra-skeletal comorbidities [29]. Age, gender and social conditions cannot by themselves explain all of the comorbidities associated with hip and knee OA. Rheumatic diseases are often correlated with other health problems, admittedly more often starting at 65 years of age. Further details were added on patient phenotypes, and also on the methods to carry out the exercise programs. We can now find information about the types of exercises, anatomical locations, intensity and even specific examples. These updates have made it possible to better adapt the type of exercise to the patient phenotype, their baseline level of fitness, capacity and objectives, so as to maximize the potential of the treatment effects and also improve adhesion (Appendix A).

4.1.4. Intrinsic and extrinsic factors affecting the practice of physical activity

In a review on diabetes [30], a physical activity is considered general when it encompasses all the activities that require energy output. This activity can be in a professional, domestic, recreational or occupational context. Exercise is considered specific when it is prescribed by a health professional. It must be adapted to the patient's profile and condition.

When it comes to exercising, it is interesting to look from the point of view of arthritic patients to better understand why their activity level is so low. This requires looking into factors that determine acceptability and motivation for exercising, and to identifying the obstacles.

An article published in *Family practice* [31] talks about various patient profiles: sedentary, active, former participants and exercise converts. The article defines various patient categories to explain the behaviour of patients relative to exercise [31]. The first is focussed on the perception of their physical limitations. Patients feel they are limited due to pain, stiffness in their knees, general lack of physical conditioning, which in some cases is attributed to aging and comorbidities. The second bring outs their beliefs about the role of exercise and its effects on knee OA. This includes various factors such as personal experience, professional advice (vague or absent), and the OA aetiology (overuse, pain, excess weight). The last provides information about motivational factors such as pleasure and social support during the practice and control of the disability, but also the low prioritization, laziness and lack of motivation. For this reason, it is important to adapt the practice to the type of patient and the patient's perception of exercise.

It is also possible to talk about obstacles, and intrinsic and extrinsic facilitators of physical activity in patients suffering from OA [32]. Internal factors consist of individual attributes and personal experience with exercise, while external factors encompass the physical and social environment. These factors can act both as obstacles and drivers; for example, pain and the fear of pain are important internal obstacles to exercise, while the hope of reducing pain is one of the main motivational drivers.

Other factors impacting compliance are described in the SOFMER guidelines [15]. Time is a determining factor [33], influenced by the patient's initial condition. All studies show that the participation rate decreases over time. The most disabled patients (highest WOMAC scores) more quickly abandon their regular practice [34]. The FAST study showed that social and demographic factors, current physical condition, quality of life, limitations and previous exercise habits explain 40% of the variability in the time spent exercising. Previous exercise habits is the most important factor [33]. A RCT by Cochrane [34] revealed the importance of financial aspects: a free program had a 53% adherence rate versus only 19% when patients had to pay.

The Knee Osteoarthritis Fears and Beliefs Questionnaire (KOFBeQ) is a validated tool that measures the fears and beliefs of patients with knee OA [35]. This is an 11-item self-administered questionnaire with a specific self-evaluation scale that uses a 10-point scoring system on a Likert scale. It has three items about activities of daily living, four items about physicians, two items about the disease and two items about sports and recreational activities:

- "because of my knee OA, I will stop sport activities";
- "because of my knee OA, I will have to give up my leisure activities."

To increase patients' activity levels, it is important to be aware and measure the factors that affect the exercise behaviour of patients with OA, to help health professionals create a regular practice that can be maintained, and as a consequence, provide a better quality of life for their patients. As of today, no specific tool exists to measure the obstacles and drivers for doing physical activity in OA patients. A qualitative study of the obstacles and drivers for doing physical activity has been performed. This questionnaire is currently being validated [36].

On the other hand, there is a tool that measures "a belief that an individual has in their ability to carry out a task or not" [37], which is called the "self-efficacy" concept. The version validated for OA and fibromyalgia is called the Arthritis Self Efficacy Scale (ASES) [38]. It consists of three items: beliefs related to pain management, function and other symptoms. This has become an indispensable measurement tool for educational programs [39,40]. The physical medicine and rehabilitation team at Clermont Ferrand university hospital is currently validating the French version.

4.1.5. Treatment education for hip and knee OA

WHO-Europe defines treatment education as a discipline that "has the purpose of training patients so that they can acquire the necessary know-how to strike a balance between their life and optimal control over their disease. Patient education is a continuous process that is an integral component of medical care. Patient education includes awareness, information, learning, psychosocial support, all of which are related to the disease and its treatment. The training must also allow patients and their family to better collaborate with caregivers." [41].

When it comes to hip and knee OA treatment, regular physical activity is an indispensable treatment. However, long-term adherence to physical activity and exercise programs is very problematic [15]. The MOVE consensus found that "adherence is the main predictor of the long-term outcome of exercise in these patients." [42]. Numerous recommendations related to doing activity exist, ranging from verbally delivered information to educational programs. Verbal information delivered during a consultation is not sufficient; the patient will be informed, but will not have the tools needed to put these recommendations into practice. Education allows the practitioner to explain, learn, understand and answer the patient's questions. One of the main obstacles to patient adherence is the vagueness or even lack of advice by the health professional in charge of his treatment. One of the goals of education is to transform this obstacle into a driver. Patient education plays a role in improving treatment adherence

[43]. All of the benefits cited in the recommendations about education relate to the treatment adherence, pain, disease management and quality of life. The benefits of patient education have been demonstrated in published studies, as evidenced by systematic reviews, meta-analyses [44], and recommendations made by various organizations [25,24].

A 2005 meta-analysis [45] focussed on education programs specific to older patients with chronic diseases such as diabetes, OA and hypertension. For OA, the education program significantly altered pain and function. It also found that combined education and physical activity programs influence the well-being of OA patients. Another meta-analysis carried out in 2011, showed low to moderate effects of self-management programs for pain and function over the long-term. It recommends implementing these programs in adult patients suffering from chronic musculoskeletal diseases [46].

Education programs help to maximize the potential effect of exercise programs by improving treatment adhesion [43]. As a consequence, it seems absolutely essential that education programs for knee OA include instruction about how to do the exercises [27]. The education of arthritic patients and the contents of education programs vary between studies. It has been clearly shown that education combined with physical activity is the most effective non-pharmacological treatment of knee and hip OA.

According to recommendations, [15–19] the care of OA consists of information about education, treatment management, physical activity and weight loss. Some programs include methods to cope with the pain, methods to help with walking, and brainstorming. These methods are all implemented with the goal of reducing the OA-related pain and stiffness that contribute to physical decline. They help to maintain or increase levels of specific exercise and physical activity [47] (Appendix A).

4.1.6. Factors limiting education in OA

Guidelines for the management of various chronic diseases, such as OA, advocate a change in lifestyle. However, it is difficult to implement these recommendations in the current medical environment, particularly for non-pharmacological treatments. In fact, only 48.7% of general practitioners prescribe physical activity, while 95.8% prescribe paracetamol [48].

The lack of implementation of published recommendations is likely due to the challenges of informing patients about various non-pharmacological treatments during a standard office visit. To get around this, a pragmatic approach has been proposed by some authors that consist in delivering only one message per visit; this was shown to be significantly effective at reducing patient bodyweight and getting them to do regular physical activity [19,49].

Medical culture and health care system financing are also possible limitations. For example, telephone reminders are effective but are a relative rare practice in many countries. Despite a relative low cost and demonstrated effectiveness, information booklets with scientifically validated content have only a limited impact. Other strategies have been implemented by large health institutions on a national scale. For example, the "Keeping Moving" campaign in Great Britain promotes health by increasing physical activity levels [50].

5. Discussion

5.1. Summary of results

Given the existing highly convincing data, the combination of exercise and education about weight loss is considered the first-line treatment for hip and knee OA. Recommendations from learned societies prove that education leads to better treatment adherence, reduction in pain, better management of the disease and improved quality of life. Weight loss and exercise lead to better function and less pain. Hence the benefits of combining treatments to reinforce the effects. These main findings have a "strong" level of evidence or grade "A", meaning that they are supported by established scientific proofs. The selection of level of evidence was done according to recommendations of the French National Authority for Health (HAS).

Several tools that have been validated for OA can be used to determine the patient profile: the IPAQ can be used to measure the level of physical activity, the KOFBeQ to assess beliefs and fears, the WOMAC to determine functional capacity and the ASES to evaluate the ability to manage the disease. These tools help to establish and adapt the specific dosage of each physical activity and specific exercise program, focussed on the patient profile.

5.2. Limitations

The recommendations and RCTs were analysed simultaneously in this article. This was done to give this review of literature a qualitative perspective as it is intended for current practice. In fact, the RCTs contain detailed exercise programs. For example, the concept of agonist and antagonist muscles to balance out the skeleton can be found in some studies. On the other hand, most of the guidelines recommend only strengthening the quadriceps muscles [21,51], or strengthening of the legs and quadriceps [17,25], without further details. Only EULAR includes information about intensity: "moderate to vigorous 60–80% of 1 RM for 8–12 repetitions" [16]. In other guidelines, the advice about intensity are on the order of "increase as a function of time and duration, based on the patient's individual capacity". Similarly for aerobic work, there is no concept of adjustment according to VO_2 or ventilatory threshold. However, the contents of education programs are not very detailed and exercise education is merged within the general educational objectives, both in the recommendations and RCTs.

Another limitation is the risk of bias brought to light in the RCTs. This was low; two trials had a selection bias [18,19] and two others had a data collection bias [52,20]. Volunteer-based recruitment can result in the inclusion of subjects who are more prone to changing. Subjects are asked to report some information themselves, for example the number of hours of physical activity. This data can be overestimated or underestimated by patients. Having a large number of subjects helps to reduce this bias.

To take the patient's profile and phenotype into account, there is no validated tool for OA that we know of that helps to measure the obstacles and drivers of practice. One of the future perspectives will be to create this tool and then validate it in an arthritic population [36].

6. Conclusion

Given the lack of curative treatments for hip and knee OA, the most recent recommendations are focussed on non-pharmacological treatment. The aim is to modify the lifestyle of patients, particularly in terms of their physical activity level and weight loss.

The triad of education, exercise and weight loss is the first-line treatment among the recommendations for non-pharmacological treatment. This type of care must be focussed, adapted to the patient's profile, aetiology and phenotype of the disease, without forgetting to address any associated comorbidities. This care must be proposed by a multidisciplinary team and be subject of regular monitoring over the long term. The exercises must be prescribed with a dosage and gradual approach, while taking into account patient preferences.

Treatment education programs must be built using suitable educational information, learning about self-management of the

disease and selecting the medium that will be used to transmit the message. By taking into account and putting together these variables for each intervention, treatment adhesion can be increased.

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Disclosure of interest

The authors declare that they have no competing interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.rehab.2016.02.005.

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